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General Articles

IMMUNISATION—ITS PRACTICAL APPLICATION IN THE CONTROL OF ANIMAL DISEASES (PREVENTIVE AND CURATIVE)*

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We live in the age of vaccines and serums and there exists a popular feeling to-day that products of such a nature can be found for the prevention and cure of practically all diseases of our domestic animals. I do not share that view. Many animal diseases are, in my opinion, the direct result of artificial conditions under which the animals are bred, reared and kept. It may be that for economic reasons it is necessary to subject animals to such conditions: if so, then we must study the diseases which are bound to follow and elaborate methods for their control. I do hold, however, after quite a number of years of observation, that, especially in specific infectious diseases, biological products certainly have a place in the control of animal diseases, but I do refuse to accept them as the beginning and end of all disease control. I am more and more impressed all the time with the work carried out by the biochemist—a member of the scientific community whose true value in the study of disease questions is, in my opinion, not nearly sufficiently realised. The various "obscure" diseases regarding which our knowledge is so meagre must come within his purview and I hold that the various "deficiencies" resulting from the ill balance of the various food elements upon which health depends, may have a big bearing in the incidence of even our recognised specific infectious diseases. It is true that in some cases the virulence of the infecting micro-organism is so great that a high percentage of exposed animals will become infected and the only way by which it is possible to prevent infection is to induce in the animal a state of immunity to the specific infection.

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Immunity

Immunity to disease may be naturally or artificially acquired. Apparently a definite natural immunity to certain diseases exists in different species of animals, *e.g.*, the cat is immune naturally to infection with the virus which causes distemper in dogs. Sometimes this natural immunity is not absolute but only exists to a degree, *e.g.*, sheep are especially susceptible to infection with members of the anærobic group of organisms, while under natural conditions dogs are apparently immune though they can be infected if large amounts of culture are injected. Even in such a case the degree of response to the infecting material varies considerably in individual animals and, further, depends on whether the exposure to infection occurs naturally or is artificially applied. Thus, pigs are highly susceptible to infection with the bacillus causing swine erysipelas when they pick it up under natural conditions. On the other hand, the introduction of the infecting organism by injection through the various routes is only partly successful in setting up the disease. Further, a species of animal which resists infection with an organism highly pathogenic to another species can, by custom over a lengthy period, be made susceptible, *e.g.*, in African horse sickness the fresh virus appears to have no pathogenic effect on the mouse, but recently it has been shown that by repeated passage in the mouse brain the virus becomes pathogenic for this animal, and now that it has become acclimatised to the mouse, the mouse strain has lost its pathogenicity for the horse though retaining its antigenic value. Advantage is taken of this observation in the use of the mouse brain strain of virus as a vaccine for the prevention of the disease in the horse. Then again, we find that all animals of the same species are not necessarily equally susceptible to the same infection. In an outbreak of any infectious disease though animals may be equally exposed, it is rare to find that 100 per cent. develop the disease or that those developing the disease suffer equally severely. This is usually explained on the grounds that the resistant animals have already developed specific immunity probably through past exposure to the infection even to a mild degree. Doubtless this is true in a large number of cases, but I feel that this does not account for all such occurrences. The breeding of animals resistant to disease is a study being actively pursued in different countries and it seems

possible that within limits it may be of practical value. Whether resistance to infection as a whole or only to a specific condition is inherited is hard to say—my own opinion is that it is resistance to disease as a whole which is inherited.

NATURALLY-ACQUIRED IMMUNITY

As a rule, as an animal becomes older it is immune to many of the commoner infectious diseases, *e.g.*, it is comparatively rare to find true distemper in a dog, say, over a year old, especially if the animal is at liberty. Strangles in horses occurs usually during young life—it is seldom that it occurs in older animals and when it does occur the affection is not usually serious in character. Such immunity largely depends on the chances the animal has had of becoming infected with the particular specific agent during its early life. Experiences with canine virus distemper show that in many cases the absolute isolation of the dog from infection renders the animal still susceptible, no matter at what age it may subsequently be exposed to the infection. Immunity established by natural infection is usually of a lasting nature. Thus, recovery from an infection is usually regarded as a safeguard against further infection. It must be pointed out, however, that the immunity is only relative and in the absence of further exposure may fall to a low ebb. When a further stimulus in the form of a certain amount of infective agent is given or picked up, provided the degree of the original immunity acquired naturally has not fallen too low, there is a response on the part of the tissues to produce a further amount of immunity and so the degree is raised. It can thus be seen that the degree of immunity following subsequent exposures to the specific infection rises after each exposure and hence when more or less constant or regular exposure is present the exposed animal remains in a high state of immunity. When the original acquired immunity was low in degree and the subsequent exposure was long delayed, and where the virulence of the subsequent infection was high, there is a considerable chance of the immunity breaking and the animal suffering from the effects of the subsequent infection. These breaks are, in my opinion, more common than is generally supposed.

It is often claimed that immunity to disease exists to a large extent in suckling animals. This seems to be borne out by observations every day. On the other hand, there are diseases which are specially concerned with young animals only and in which, as the animal grows older, the disease—at least in the form found in the young animal—fails to develop. In this connection I cite lamb dysentery. After the lamb has reached, say, three to four weeks old the typical disease is seldom observed, *i.e.*, the condition characterised by the typical intestinal lesions. I would, however, point out that in this disease I do not believe that the resultant resistance to the disease in its typical form is the result of a naturally-acquired immunity, but is due rather to the physiological activities of the intestinal tissues which render the intestine unsuitable for the growth and development of the causal organism. In this disease I also feel that the organism, under certain conditions, attempts to alter itself to the conditions in the intestine and tissues and may produce disease though the symptoms and lesions are entirely different from those found in the young lamb.

From the result of experiments carried out by ourselves and others it seems fairly certain that in most of our domestic animals there is no transference of immunity to the fœtus *in utero*, but that the young animal is born in a highly susceptible condition as far as infectious disease is concerned. I refer, of course, to the healthy, normal uterus. In the pregnant female, however, as the udder begins to function there is among other things a high concentration of immune bodies from the general system to the colostrum. In animals artificially immunised the amount of antibody in the colostrum greatly exceeds that which can be detected in the general circulation. We have also shown that such immune bodies can pass through the intestinal mucous membrane of the young animal up to at least four days; hence, if the mother has immunity to a specific disease, within a few days of its birth the young animal will have acquired an immunity consequent upon the ingestion of colostrum. As the colostrum gives place to milk so does the amount of immune body become less and less and the older the animal becomes so does it eliminate more and more of the immune body so acquired, till, soon after weaning, it no longer has any immunity to the infection in question and is therefore again in a state of susceptibility. If it is now to become immune, it must go through the natural disease in some form or be immunised by artificial methods.

ARTIFICIAL IMMUNITY

So much for natural immunity. It is with artificially-produced immunity that we are more concerned, for the induction of immunity is largely practised to-day in the control of animal diseases. In many cases it is followed by the desired result, but in diseases in which the cause is doubtful the results are usually hopeless, and where good results are recorded they are very often purely chance results.

Two types of immunity may be produced artificially—active and passive. Generally speaking, in the production of active immunity

the tissues of the injected animal are called upon to produce active antibodies. The material injected, referred to as the "antigen" or more popularly the "vaccine," is the stimulus just as in naturally-acquired immunity the stimulus is the infective agent picked up by the animal. In passive immunity, on the other hand, the tissues are not called upon to make a response to the injected material, for the substance injected is laden with already prepared antibody. This substance is usually the serum of an animal hyper-immunised by repeated injections of the antigen.

Vaccines or Antigens

Because of the response of the tissues to produce immune substances consequent upon the injection of an antigen, the period required by an animal to become immune following the injection is fairly long. Several days at least must pass before much immunity is developed and, in fact, it may be as long as some weeks. Again, a single dose of an antigen may not be sufficient to set up a high degree of immunity but may simply lay a foundation for the reception of a second stimulus in the form of another dose of the antigen, given at the appropriate interval or in the form of natural infection. A vaccine, therefore, generally speaking, is used in the prevention of disease and is mostly injected into animals which are in good health and which are not at the time exposed to infection but which, in all probability, will be exposed at some later period.

In the preparation of a vaccine it is necessary to ensure that the antigen is in a state such as will not in any way injure the health of the animal and at the same time will retain the essential quality of being capable of stimulating the tissues to produce the necessary specific antibodies. The ideal vaccine would be an unaltered culture or other preparation of the specific micro-organism but, naturally, this cannot be generally used because of the risk of setting up the disease itself. In some cases actual unaltered cultures are used, *e.g.*, contagious abortion (Bang) living vaccine, but usually when unaltered living cultures are used the animal is protected against their effects, *e.g.*, by a preliminary temporary immunity set up by a safe antigen, *e.g.*, distemper vaccine followed by virus or by simultaneous injection of hyperimmune serum, *e.g.*, in swine erysipelas immunisation. Generally speaking, vaccines consist of the following:—

(1) *Cultures of Living Organisms.*—As above or as in the case of fowl-pox immunisation in which the living virus passaged through another animal is used—in this case the pigeon.

(2) *Altered Living Cultures or Viruses.*—The alteration may be affected in several ways, the most important of which in general use are the action of heat and chemicals. In vaccines in which heat is used to destroy or attenuate the living elements considerable care must be exerted to prevent overheating which may destroy the antigenic properties of the antigen and at the same time sufficient heat must be used to render the material innocuous. Chemicals are now largely used, especially formalin, *e.g.*, in distemper vaccine and vaccines for use in the prevention of anærobic diseases of sheep. Phenol may also be used, *e.g.*, in the preparation of vaccine for use in the prevention of leptospiral infection in dogs.

(3) *Cultures, etc., Altered by Cultivation.*—The cultivation is usually carried out on special media or by passage through animals of another species, *e.g.*, the various vaccines advocated in the immunisation against tuberculosis consist of cultures grown on media antagonistic to their growth.

(4) *Toxins and their Modification.*—Many organisms produce toxins when grown on artificial media. The anærobic groups are especially noteworthy in this respect. In some cases these toxins are used as vaccines or more commonly the toxins altered by the action of formalin and now called toxoids, *e.g.*, tetanus toxoid, vaccines for use in the prevention of blackleg, etc.

(5) *Animal Tissues.*—Tissues, *e.g.*, muscle, impregnated with spores of organisms, have been used in the prevention of diseases such as blackleg in cattle and sheep. A further method of immunising against the same type of disease is the use of the natural juices or aggressins expressed from the muscles and tissues of animals injected with the causal organism. These methods of immunisation have gradually given place to the use of so-called artificial "aggressin," *i.e.*, the filtrate of the liquid culture in which the organisms have been grown.

We have dealt so far with vaccines used for the prevention of disease. Vaccines are sometimes used in the cure of some diseases, especially those of a suppurative character. Organisms are isolated from the affected focus and cultivated. A vaccine (referred to as "autogenous") is prepared by the action of heat or chemicals and injected in a series of doses at intervals. The object is to cause a general tissue response in the elaboration of the respective antibodies.

Serum

Passive immunity is created in an animal by the injection of hyperimmune serum containing the specific antibodies. In this country the horse is largely used for the preparation of such serum and is treated over a period with increasing doses of the respective antigen. The serum is rich in antibody and in some cases in order to increase the amount of available anti-

body in a small amount of the fluid, a process of concentration is carried out. Sera are antitoxic or antibacterial in character. At the present time our accurate knowledge regarding antibacterial sera is limited and it is doubtful whether such sera do all that is claimed for them. Antitoxins, on the other hand, can be carefully measured and titrated and are of the utmost value. Perhaps the best known antitoxin is that of *C. tetani*, which every veterinary surgeon in practice has used. Antitoxins and antibacterial sera are largely used in the treatment of affected cases though they are also of great value in preventing the development of disease due to the specific agent. Serum creates the establishment of immunity at once, though because of the more or less rapid rate at which it is eliminated the immunity is of comparatively short duration. Antiviral sera is also being largely used, *e.g.*, anti-distemper serum prepared in dogs or horses.

Within recent times antitoxins prepared from the gas gangrene group of organisms have found a place in veterinary medicine in the prevention and treatment of anærobic infection in animals.

In my opinion, the essential of all vaccine and serum therapy in the immunisation of animals is the knowledge that the products are prepared from the specific causes concerned and are tested for protective and curative value, *i.e.*, that they are standardised. The Ministry of Agriculture has now power to make Orders for the standardisation of veterinary biological products, so possibly in the near future we may expect that all such products issued from the various sources will conform to a certain standard.

Discussion

Opening the discussion, Captain J. C. Coleman thanked Major Dalling for his instructive paper, which, he observed, had raised many interesting points. He agreed with what had been said, but would make a few remarks.

There were many things encountered in the veterinary profession which at present were obscure and veterinarians welcomed the co-operation of the various research workers, including the biochemist, for, with their help one could be hopeful of light eventually shining in those places which at the moment appeared rather dark.

He asked the essayist if he could explain the difference between a toxin and an antigen.

With regard to distemper in dogs, the speaker pointed out that isolation from sources of infection was no guarantee of the development of immunity, for he knew cases where dogs that had been kept entirely free from any known source of infection had developed distemper later in life when exposed. He hoped Major Dalling would tell them something further on the part played by the bitch in passing a certain amount of immunity to its young, and at what stage this immunity was lost.

He hoped Major Dalling would tell them his opinion of the Spahlinger treatment. The Spahlinger method was the use of a vaccine. He asked if it could be explained why a vaccine which had been prepared by allowing the specific organism to die a natural death should increase the period of immunity upon being inoculated into an animal, as he understood that ordinary vaccines killed by heat or by chemicals gave only a short period of immunity.

Another question he would like to ask was, when an animal was treated with an autogenous vaccine, was the immunity active or passive?

Major F. J. Taylor, speaking from his own experiences, said that he was disappointed with the results he had obtained from the use of anti-tetanus serum. His disappointment was in regard to the curative properties of the serum only, for as a preventive it gave excellent results.

With regard to distemper, he found that the simultaneous use of serum and virus was a very successful measure so far as prevention was concerned. He had not had good results in the treatment of jaundice in greyhounds with anti-leptospiral serum. With reference to abortion, he observed that it was important that the farm on which live vaccine was used should be regarded as an abortion area. It should be insisted upon that all animals on the premises were inoculated, and that in the event of the arrival of other animals on the farm they should be inoculated three or four months before the first stocking.

Mr. J. Golledge remarked that the points raised by Major Dalling about distemper were extremely interesting, and especially the fact that dogs kept in rigid isolation were liable to contract the disease later. He wondered if breeding played a part in the natural immunity of some dogs to distemper. It was true that distemper was more prevalent in highly-bred dogs and that the mongrel animals were not so subject to it. It was a fact, too, that distemper was more difficult to cure in the well-bred animals. He had used the vaccine and virus inoculation against distemper with success. The drawback against the simultaneous method was that it was often difficult to get the owners of the dogs to take the temperature as regularly as was required.

Captain J. R. Hewer raised the interesting point as to whether the calf that sucked a tuberculous cow was immune from the disease itself. He asked if the young animal was more immune if its dam was suffering from tuberculosis. He was aware that some maintained that the way to prevent children having tuberculosis was to give them infected milk, but that was a very doubtful point. He wondered if the natural immunity to distemper shown by some puppies was acquired from their mothers.

Mr. Esmond Brown spoke of the great advances that had been made in the veterinary and medical professions by research. At the same time, he was wondering whether there had been too much attention given to those subjects in which there was most enlightenment and that, as a result, the subjects about which least was known had perhaps in some ways been neglected. Research upon every subject was, of course, very warmly welcomed and it was good to find out all they could about specified diseases, but at the same time there were diseases about which their knowledge at present was limited. Regarding the subject of artificial immunity, he instanced the case of rinderpest for which a highly efficient serum was available, but mentioned that in the case of foot-and-mouth disease the use of serum was limited till we knew more about the various types or strains of the virus.

Mr. Brown said that he was of the opinion that conditions and localities played a bigger part

than some believed with regard to various diseases, and research was throwing valuable light on the many important factors connected with both conditions and localities in the control of many diseases, particularly concerning poultry and sheep. It was in these matters that the biochemists could be of very great assistance to those engaged in the veterinary profession.

Captain J. J. Aveston referred to the beneficial use of the various antisera (tetanus and leptospiral) for preventive work. He, like other speakers, could not claim much success following their administration in animals actually affected. He had not found distemper serum of great value in the treatment of affected dogs. Regarding the immunisation of dogs against distemper, his present feeling was that the more successful method was the use of virus and serum with an interval between. He thought the interval should be longer than that recommended —probably several hours. When consulted regarding the immunisation of dogs, he always pointed out that there was a certain amount of risk which must be accepted.

Mr. R. Moore dealt with the prevalence of influenza in horses. He asked if any recent discovery had been made that would throw fresh light on the treatment or that would help towards the restriction of this common and troublesome disease in the stables. He had 40 years' experience in regard to treatments for influenza and he found that, so far as serum was concerned, it was unsuccessful as a preventive. He drew attention to the fact that "carriers" may exist and that such horses, though apparently fit, may carry a slight temperature for many months.

The President (Mr. T. J. Margarson) referring to the relationship between the tuberculous animal and the human being, asked whether, if the tuberculous cow was eliminated, the country would be free from tuberculosis in human beings. It was recognised, he observed, that the white race was more prone to the scourge of tuberculosis than were the dark races, and it would be instructive and interesting to find the actual relation between the tuberculous animals and the infection of human beings. He wondered if, in the event of the provision of a national supply of milk absolutely free from tuberculous infection, the nation would be rid of the "white scourge." The President also asked if there was any possibility of producing a reliable vaccine against abortion in cattle which could be used as a living vaccine in certain animals and as a dead vaccine in others. He also mentioned lamb dysentery and asked at what age lambs began to show evidence of pulpy kidney. He mentioned the case of a dog which received distemper vaccine and was not brought to receive the virus. He wondered how long the immunity from vaccine alone would last.

The Honorary Secretary (Mr. C. E. Perry) spoke of the properties of anti-tetanus serum. He agreed with previous speakers that it was ideal as a preventive, but as a curative measure it was "not so good.' Mr. Perry said that he was surprised to hear the recommendation that in regard to the virus-serum treatment for distemper in dogs there should be an interval between the injections. He had always carried out the injections simultaneously and had not yet had a single dog show a breakdown in immunity. Mr. Perry thanked the essayist for his helpful address and said that the visit of Major Dalling had been very much appreciated.

The Reply

Major Dalling thanked the opener and speakers for their remarks. Replying to the questions, he said that he would again like to make it clear that the value of vaccine and serum therapy had been exaggerated by some enthusiasts. When properly used, vaccine and serum gave satisfactory results. Replying to the opening remarks by Captain Coleman, the essayist said that the answer to the question, "What is the difference between a toxin and an antigen?" was that a toxin became an antigen when it was used for the production of immunity. He did not wish to go into any controversial matter connected with the Spahlinger treatment, for it was not fair to pass judgment upon a treatment until all the facts and all that was claimed for it were more fully known. He indicated, however, that from the published results it seemed that a degree of resistance had been obtained from the vaccine. The Spahlinger treatment was based on the use of a vaccine made from organisms cultivated on special media and allowed to die naturally and it might be that a vaccine produced by such a method might give a high degree of immunity.

He next dealt with the so-called "breakdowns" in immunity and said that in some cases immunising agents had been condemned as not effective because the animal under treatment developed symptoms at some later time bearing a close resemblance to those observed in the disease against which the immunisation had been carried out. He thought it was hardly fair to judge immunising methods or products without being first satisfied that the symptoms in question really represented the true disease. He knew that in some cases the immunity conferred artificially was of low order, but he would not agree that this was the case every time. It had to be remembered that in many of the diseases affecting animals the general symptoms would lead one to believe that a simple disease was present, whereas it was becoming more obvious that several diseases might present the same general picture to the clinician though the causes might be entirely different. He emphasised that as time went on more accurate information would be forthcoming on this subject.

He agreed that the chief value of anti-tetanus serum was in its preventive and not its curative properties. Of its preventive value there could not be any doubt, as was shown in the European War. Immunisation against distemper in dogs could be carried out in two ways—vaccine followed by virus, or virus followed by serum. Both methods were sound. It had to be remembered that the vaccine followed by virus treatment entailed a waiting period, and it was essential that an adequate interval should be allowed. Virus was now used entirely in the dry form and it was found, when using it in conjunction with serum, that an interval should elapse between the injection of the virus and the serum. From observation it was deduced that at least one hour should elapse. He felt that the best way to test the results of the distemper immunisation was in kennels of dogs not normally exposed to infection and not among privately-owned dogs, for the latter were constantly being exposed to infection and so picking up small doses which kept the immunity high.

He dealt with the subject of secondary infections following on illnesses due to distemper virus and expressed the opinion that the losses following true distemper were practically always due to these secondary complications. In true uncomplicated virus infection deaths were rare.

Concerning jaundice in dogs, the essayist said that leptospiral serum was useless against any form of jaundice except that caused by the leptospiral organisms.

THE COMPARATIVE STUDY OF CLINICALLY-ALLIED VIRUSES*

Some Unsolved Problems of Edward Jenner

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My first duty and privilege is to thank you for the great honour you have conferred on me by choosing me as your President during the coming session. I value the honour all the more from my having some twelve years ago passed the chair of the Section of Pathology. During my tenure of that chair, I may recall that the proposal was put forward to found a Section of Comparative Pathology and I then found myself among the non-placets, believing that pathology was nothing if not comparative. Nevertheless, the final decision to found a Section of Comparative Medicine was, I sincerely believe, on all counts a wise one and I frankly acknowledge the great influence for good that this section has been, not only in bringing together a wider circle of workers genuinely interested in animal pathology and comparative medicine but also in affording a welcome additional platform for the discussion of current problems in what is without doubt a rapidly progressing field of enquiry. Comparative Medicine is one of those all-embracing titles like Medical Research or Preventive Medicine and in these days when light may and does come from any and every quarter it is well to have a section to which nothing can be foreign. I am sure that, at any rate, the subject on which I propose to address you to-night, will not seem foreign to you.

Of late we have had quite a number of general reviews and critical disquisitions on the virus question, some by active workers in the field, others by interested onlookers in other fields to whom the problems of "Life in little," if such really does exist, offer a special appeal. I do not propose to add another to these.

On various occasions in the past I have reviewed the position of the pock diseases particularly in relation to smallpox vaccination and I make no apology for employing these diseases again as a text for my subject to-night, but my concern will be only with the problems they present to the student of comparative pathology and fundamental virus research in particular.

For the last 150 years no virus infections have been more assiduously studied than those of the pock diseases of man and animals and at no time more persistently and fruitfully than during the past decade. It would be a mistake, however, to suppose that it is only the present-day worker who finds himself confronted with apparently intractable problems in this sphere. These same problems will be found to have been very thoroughly appreciated by the older workers of a century or more ago though their objectives in attempting their solution were very different. To them, for example, it was of vital importance to secure by hook or by crook a protective lymph when normal supplies failed or were unobtainable and hence their urge to hunt for cowpox or for what was usually far more likely to come to the light of day, *viz*., lesions on the hands and arms of milkers which called for treatment and incidentally could be pressed into service as new sources of protective lymph, but of this more presently. The difficulties these early workers met with still have a lesson for us when we are occupied more with fundamental studies on viruses and perhaps less with practical considerations such as vaccination against smallpox. Jenner made protection against smallpox possible and though since his time great theoretical advances have been made, and we can now with fair certainty speak of and manipulate the actual virus agent, the only advance which we can register in Jenner's sphere, and it is an advance as yet only tentatively exploited, is the rendering of Jenner's prophylactic more æsthetic and acceptable by administration of the virus of vaccinia in its purest form freed entirely from associated organisms. In other respects Jenner's discovery, like that of Pasteur in another sphere, remains to-day practically unmodified.

Where in the historical development of this subject, which I shall not even attempt to sketch, do we begin to find matter of the highest scientific interest to us to-day? Undoubtedly I think with the practice of variolation whose origin is lost in antiquity, but certainly goes back a thousand years or more before the Christian era. It was a discovery of the eastern civilisations of India, China, Abyssinia, etc., lands long and continuously ravaged with smallpox before the western peoples knew it and in all probability the discovery, like that of Jenner's in another connection, was the culmination of frequently and independently observed phenomena suggesting that smallpox was not likely to be contracted twice and that infection entering the body through skin traumata ran a more benign course than usual. Several features of the variolation ritual as practised and supervised by the medicine men and priests in various eastern countries, interest us from the standpoint of modern experimental work on viruses. In India before variolation the subject to be inoculated had to undergo a

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strict dietetic régime and after the operation, which was performed upon the upper arm by placing wool dipped in smallpox secretion on a scratched surface, the patient had to live in the open away from people and on a light diet. The object of this preparatory dietetic routine and its continuance after the operation was presumably to reduce the intensity of the smallpox reaction. I may say that recent experimental data are available indicating a modification of virus action and of susceptibility to virus, by deliberate restriction of diet or other nutritional interference. In China, we are told, the inoculum consisted of smallpox crusts mixed with musk and rolled into a pledget of wool which was inserted into the nose, while in Siam the dried infective material was simply insufflated. The material used may have been preserved for many months in the dry state so that in all probability its infective power had suffered some attenuation through mere conservation. The addition of the musk containing an essential oil, acted probably in the same way as the modern bacteriostatics and the introduction of the infective material by way of the respiratory tract would suggest a knowledge of the natural site of entrance of the smallpox virus—a subject still claiming the attention of the experimental pathologist—though whether this route of introduction led, as might have been expected, to more severe infections, we have, I believe, no definite information.

Smallpox came to Europe probably round about the sixteenth century we are told, and though it is quite likely, as Crookshank states, that variolation had been independently discovered and secretly practised by peasants in Italy, France, Wales and Scotland, it was its importation from the East, largely through the efforts of Lady Mary Wortley Montagu, that brought the method into prominence. Lady Mary's infant daughter was, we are informed, the first person to be inoculated in England in April, 1721. This is not the place to comment on the results of variolation so far as the inoculated individual was concerned or on the attendant dangers of the procedure to the community by the deliberate spreading of an infectious agent of probably reduced virulence yet still contagious. There is little doubt, however, that fatal issues in the hands of capable inoculators were surprisingly small. The Suttons' regimen for variolation, to which was attributed their great success as inoculators, did not differ essentially from that of the eastern rituals in insisting on spare diet, cooling drinks and life in the open. It may be said, in fact, that the long-recognised necessity of paying careful attention to the state of health of candidates for vaccination in modern times is only a reflection of an old-established eastern rule. Was any genuine lasting attenuation of the variola virus achieved by the practice of variolation in human passage? There would appear to be little doubt that in so far as the local lesion was concerned it was, in the hands of certain inoculators who carefully selected their material from primary vesicles only, capable of approaching closely to that resulting from vaccination when the latter procedure came into use and had to contend for popularity with established variolation procedures; secondary pocks might in such cases be either very few or absent. Were such human-passaged strains of variola available now, it would be of the greatest interest to determine how far, if at all, they might differ antigenically from the variola-vaccine derived by passage from man to other mammalian species. Can, in fact, the change from variola to the attenuated variant known as vaccinia take place without transference to another host?

Variolation, an effective method of smallpox prevention, yet not without risk to the individual and the community, was essentially a product of the deductive logic of independently reasoning beings in probably many isolated communities. In this country it had a long life and survived, though precariously, into Jennerian times. Let us leave it with the remark that for all time it must occupy an outstanding place in the development of our knowledge of immunity as a way of forestalling a natural disease and robbing it of much of its power for harm.

With the advent of Jenner and vaccination we enter an entirely new field of endeavour and one in which, for the first time, observation and experiment go hand in hand. May I quote in the laboratory language of to-day the two cardinal experiments recorded in the famous *Enquiry* of 1798, on which rests Jenner's claim to immortal fame? Jenner was then in his fiftieth year.

Exp. 1, *May* 14*th*, 1796.—J. P., male, 8 yrs., inoculated in the arm in two superficial incisions with matter from a sore on a dairymaid's hand, contracted in the course of her work as a milker.

7*th day*.—Uneasiness in axilla. 9*th day*.—Chill, loss of appetite, slight headache, restlessness at night. Lesions on the arm very similar to those produced by variolous matter.

10*th day*.—Patient perfectly well. Local lesion disappeared without causing any trouble.

July 1*st*, 1796.—J. P. was inoculated on both arms with matter taken straight from a variolous pustule. No disease followed. Some months later patient again variolated but no take resulted.

Exp. 2, *March* 16*th*, 1798.—W. S., male, 5 yrs., inoculated with matter taken from the teats of a cow suffering from cowpox.

Patient became indisposed on 6th day, but quite well after 8th day. Local lesion similar to that of J. P. of Exp. 1.

March 28th.—Matter from J. P. transferred by inoculation to W. P., male, 8 yrs. On 6th day axillary pain. On 7th day feverish symptoms appeared like those following smallpox inoculation but lasted three days only. Local lesion resembled that following inoculation of variola.

April 5th.—Several children and adults inoculated with matter from W. P. Most of them fell sick on 6th day and were well on 7th, but, in three of them, secondary symptoms arose owing to an erysipelatoid inflammation appearing in the inoculated arms and spreading some slight distance from the pustule. It subsided after treatment with mercurial ointment.

April 12th.—Matter from the arm of H. E., one of those inoculated on April 5th, transferred to J. M., male, 1 yr.; R. J., male, 11 months; M. P., female, 5 yrs.; and M. J., female, 6 yrs.

Result.—All except one took normally.

? date.—Matter from M. P. transferred to J. B., male, 7 yrs. Fell sick on 8th day with usual slight symptoms and without any inflammation on the arm beyond the common efflorescence surrounding the pustule.

Tests for Immunity to Smallpox Inoculation.—Performed on date not mentioned on three of above series, *viz.*, W. S., the first of the cowpox series; W. P., the first man to man passage; and on J. B., the fourth man to man passage. (W. P. and J. B. inoculated by Henry Jenner.)

Result.—W. S., no effect whatever. W. P. and J. B., on second day incisions inflamed with pale surrounding inflammatory ring. On 3rd day, inflammation still increasing and considerable itching of arms. On 4th day inflammation subsiding and hardly perceptible on the 6th. No general indisposition followed.

Simultaneous Test of Potency of Variolous Matter Used.—This was done on one individual who had never had cowpox. The result was the conveyance of smallpox in the usual regular manner.

Remarks (in Jenner's own words): "These experiments afforded me much satisfaction; they proved that the matter in passing from one human subject to another through five gradations lost none of its original properties, J. Barge, being the fifth who received the infection successively from William Summers, the boy to whom it was communicated from the cow."

Some of you may say: But what of Benjamin Jesty? Benjamin Jesty was a farmer who is said to have had the cowpox and who deliberately vaccinated his wife and two sons with cowpox in 1774. Fifteen years later, in 1789, the two sons were variolated along with others who had not had the cowpox. They escaped infection while the others went through the usual course. There is nothing in the story to indicate that the variolation test in 1789 was in the nature of an experiment and it was not till 1803 when Edward Jenner's credit was well and deservedly established, that the story of Jesty was made public by the Rev. Dr. Bell acting as Jesty's mouthpiece. To my mind the story of Benjamin Jesty is not relevant to a discussion, at this late date, of these high matters, however much it may have impressed at one time the seekers after spurious priorities and the detractors of Jenner's great achievement.

Now, what was and what is this cowpox—for it is still abroad in the world—and what virtue had it that made it, as countrymen observed and Jenner experimentally demonstrated, an apparently effective prophylactic against human smallpox? We are here in a region of old and perhaps still smouldering controversy, but we can now consider the matter calmly, for between our time and Jenner's lie the rise and gigantic development of the bacteriological era, with, of late, more than an inroad into the nature of those agents called viruses of which Jenner was the pioneer student. The central truth of Jenner's discovery we can appreciate now more clearly than Jenner, with all his enthusiasm and confidence did himself, or his many detractors, only too eager to seize on apparent anomalies, discrepancies and failures in his method and practice, that to us are plain. It is a fact that though cowpox was, as Jenner says, a traditional malady of the countryside both among cows and among milkers, the first clinical account of it in any language appeared in Jenner's famous *Enquiry*, from which I have quoted. It was not a very full account, but in some respects it was extraordinarily far-reaching in its scope in that he claimed to descry the very origin of cowpox. Here perhaps he was only following the custom of the time which always demanded that some consideration be given to origins, but it is fairly clear that the name he gave to the disease in the title page, *viz.*, the *Variolæ Vaccinæ*, was deliberately chosen to indicate to the world at large that the cowpox owed its protective merits to some kind of affinity with smallpox. To give it a name that might suggest an entirely different affinity would have only confused a world that understood and appreciated the meaning and purpose of variolation.

The *Enquiry* begins with an admirable pre-

amble obviously designed to warn the reader of the dangers that lurk in any too close association of man with animals. It has still a lesson for us, as recent discoveries in the virus field only too clearly teach. "The deviation of man from the state in which he was originally placed by nature seems to have proved to him a prolific source of diseases. From the love of splendour, from the indulgences of luxury, and from his fondness for amusement, he has familiarised himself with a great number of animals which may not originally have been intended for his associates. The wolf, disarmed of ferocity, is now pillowed in the lady's lap; the cat, the little tyger of our island whose natural home is the forest, is equally domesticated and caressed. The cow, the hog, the sheep and the horse, are all for a variety of purposes brought under his care and dominion." Such an incursion into Natural History was to be expected from the man who had been the friend and pupil of John Hunter and whose original observations on the habits of the cuckoo are said to have gained him entrance to the Royal Society nine years before.

Jenner passes immediately to refer in brief to a disease of the horse known to farriers as the grease and described by Jenner as "an inflammation and swelling of the heel." Infective matter conveyed on the hands of attendant horsemen to the teats of cows—for both horsemen and dairymaids took part in the milking of cows in Gloucestershire—produced in the teats of cows a vesiculo-pustular eruption known as the cowpox. From such cows which exhibited symptoms of indisposition and diminished milk production the contagion spread to other cows in the dairy and to the milkers themselves, who would frequently suffer from a troublesome constitutional disease accompanied by sores on the fingers, hands, arms and other parts, which only slowly healed.

Thus, three clinical entities, the grease in the horse, the cowpox of the cow, and the casual cowpox of man, are by Jenner etiologically connected and strictly in this order of passage, for Jenner believed that horsemen only rarely contracted sores on the hands directly from the horses whose lesions they dressed. "It is curious," he writes, "to observe that the virus which, with respect to its effects is undetermined and uncertain previously to its passing from the horse through the medium of the cow, should then not only become more active, but should invariably and completely possess those specific properties which induce in the human constitution symptoms similar to those of the variolous fever (he is alluding here to the casual cowpox in milkers) and effect in it that peculiar change which for ever renders it unsusceptible of the variolous contagion." . . . "May it not then be reasonably conjectured that the source of the smallpox is morbid matter of a peculiar kind generated by a disease in the horse and that accidental circumstances may have again and again arisen, still working new changes upon it until it has acquired the contagious and malignant form under which we now commonly see it making its devastations among us?" An interesting mixture, you will say, of creationist and evolutionist doctrine.

There is no doubt that the sequence, grease, cowpox in the cow, and cowpox in man, was a perfectly genuine sequence in Jenner's own experience, but loath as Jenner was to abandon his idea of the equine origin of the smallpox contagion he found that accumulating evidence interfered with his view that spontaneously appearing cowpox was a spurious form and that horsemen could be infected only indirectly. The story of the grease, indeed, gave rise to much perplexity in the minds of Jenner's followers and detractors. As one disgruntled anti-vaccinator of the year 1800 remarked: "What a hotbed of pestilence has been raised out of a crack in a horse's heel."

What do we make of this story now? The first inkling of a solution came from some experiments of John Loy, who in 1801 showed that there was grease and grease, one kind that was communicable to man and cow and another that was not. The grease that was communicable came from horses in which the local inflammatory condition of the heel was only part of a more general exanthem, while the non-infective grease might be any sort of banal inflammatory condition in the region of the heel. It is unnecessary to pursue the grease story further as it is all quite clear to us now, though it is only in recent years that what has been termed the grease has been shown quite definitely to be one of the local manifestations of horsepox or contagious pustular stomatitis. As a matter of fact, Jenner himself some years before his death (1823) had been keenly interested in stocks of equine lymph raised from sources of horsepox in this country, but more especially in France and Italy where the disease was not uncommon.

The grease, therefore, is no longer a problem. As horsepox, however, it takes its place with cowpox in a common problem still unsolved. Are these diseases *sui generis* or are they, wherever they may be found, due invariably to unwitting variolation or vaccination of the horse or cow by the hand of man? For a century this question has been keenly debated and it would seem from a perusal of current text-book opinion that unanimity had been reached in postulating for these diseases a purely extraneous origin. They would, in fact, wherever found, be man-induced and never *sui generis* and spontaneous. I confess I have never been satisfied with the evidence supporting this view.

Before the days of vaccination individual instances of cowpox prevalence would, in conformity with the conventional view, be ascribed to variola or variolation and in post-vaccination days, either to variola or vaccination. Now, while fully admitting the difficulties that all enquirers up to the present day have experienced in securing reliable circumstantial evidence of the local facts and incidents of cowpox prevalence, I find it quite impossible to take what local and temporal correlations have been unravelled between cowpox on the one hand, and variola or vaccinia in the immediate vicinity on the other, as affording really serious evidence in support of the conventional view. In the course of his masterly description of cowpox in the Vale of Aylesbury by Robert Ceely in 1840, some of the points he makes are of the greatest interest to us in this connection. Let me enumerate a few. (1) Cowpox occurs at irregular intervals and generally at the beginning or end of spring. (2) It is occasionally epizoötic but more commonly sporadic. (3) For many years the spontaneous origin of the *Variolæ Vaccinæ* has not been doubted here. (4) One hears about cowpox only if a milker requires surgical assistance and there is great difficulty in getting information even in the very neighbourhood where it arises. (5) Cowpox has occurred (*a*) during epidemic smallpox but when no cases have been in the neighbourhood, (*b*) when smallpox has been in neighbouring towns or in contiguous villages or in the same village, "but," he says, "I have never succeeded in tracing positive or probable intercourse of convalescents from smallpox, their friends or attendants with a dairy or its occupants except in one doubtful instance when the milker had carried a child some miles, labouring under modified smallpox."

Baffled in his efforts to secure direct circumstantial evidence, Ceely attempted the direct variolation of the cow, but in this sphere he was only among the first of a long succession of workers who in this and other countries essayed the direct transformation of variola to the attenuated form vaccinia. This story of the variolation of bovines I do not propose to traverse. Failure rather than success was the rule but the upshot of the whole matter was that variolation of the cow or calf was a practicable if difficult proposition. When it was successful, by direct or indirect means and artifices such as the use of intermediary animals like the monkey and rabbit, a new source of vaccine lymph became available and recourse to casual cowpox rendered unnecessary.

I shall not trouble you with details of efforts, not invariably successful, which my colleagues and I have made at various times in recent years to secure a vaccinia-like variant from variola of the alastrim type in this country, by rabbit passage alone or monkey passage followed by rabbit passage. I may, however, refer to some points in connection with this adaptation problem because in virus studies at the moment, artifices to secure adaptation to otherwise refractory species for various purposes are of increasing importance and interest. In the first place it would seem probable that little or no selection takes place in the course of monkey passage. The exuberant exanthem always obtained by direct passage from the skin of man to that of monkey is still in the main variolar and capable of producing smallpox if an unvaccinated person should inadvertently come in contact with it. The real trouble comes, however, when the monkey material has to be passed to the rabbit and it is doubtful if there is any royal road to success. The monkey material, like the human material, produces invariably when inoculated into the rabbit dermis an inflammatory node which is specific in that a mixture of the same material with antivaccinial serum produces no response. This I showed in 1924. For a short series of passages the virus can be kept going from dermis to dermis, but attempts to secure good surface takes on the scarified skin of the rabbit with dermal material generally fail. Recently, my colleague Dr. Amies, by employing testicular passage of variola in the rabbit followed by successive passage on the scarified skin, succeeded in securing a stable variola-vaccine strain. There is one interesting phenomenon which may be expected to show itself in adaptation essays and has, I am sure, a profound bearing on the variola-vaccinia transformation. Some years ago my colleague, Dr. McClean, and I* showed that a strain of vaccinia which was completely adapted to the dermis of the rabbit lost practically entirely its capacity to proliferate on the scarified surface and, *vice versa*, a strain cultivated for long periods on the surface skin could only with difficulty be maintained in passage from dermis to dermis, at any rate during the early passages. Recently Barg and Rudenko (1935)† have also studied this phenomenon and have recorded very similar findings. We do not yet know what are the precise selective factors in the various tissues which influence the nature and function of the resulting variant, but it is remarkable that such slight differences in seed-beds for implanted virus can modify so profoundly its functional properties. No doubt we shall have to study this question of virus adaptation on lines so profitably employed in recent years in connection with bacterial variation. There is at present what would appear to be a strong element of chance for we know that on occa-

* *Brit. J. Exp. Path.* **9.** 216.

† *Z. f. Immunitätsf.* **85.** 370.

sion variola has been made to yield a vaccinal variant without great trouble by direct passage to the skin of rabbit or calf.

I may say there has been no difficulty in passing to the rabbit material from two or three cases of milker's nodes or casual cowpox in this country. Material from the udder lesions with which the milkers were associated yielded lesions so heavily charged with contaminating organisms of bovine origin that the strain could not be propagated. It would seem certain that some of the alarming lesions described as occurring at the first passage of cowpox to man, were due to this complication. Later passages from man to man were likely to go smoothly. It is recorded that Benjamin Jesty, the hero of Edgar Crookshank and whose portrait he had the effrontery to reproduce as a frontispiece to his great work on the history of vaccination, vaccinated his wife with cowpox by aid of a stocking needle. The result was a very bad arm which alarmed the neighbourhood.

To return to cowpox from this digression to adaptation problems, the fact that human variola could, though with difficulty, be made to yield a variant pathogenically similar to fully adapted cowpox and, like it, capable of conferring immunity to smallpox has been one of the strong arguments in support of the view that cowpox is not an independent clinical entity and the result has been to ignore cowpox as a mere side issue. But cowpox cannot be ignored or forgotten for, as I have said, it is still with us.

We have had in quite recent years excellent reports of cowpox prevalence in Austria and in Holland. Dr. Kaiser and his colleagues‡ of the Vienna Lymph Station published a series of papers on the cowpox prevailing in Austrian farms and with the milkers' lesions with which it was associated. He comments, as Ceely did nearly a hundred years ago, on the difficulty of getting information about cowpox. The farmers, he says, are ashamed to declare its existence as the sale of their milk would be prejudiced and it was only when the milkers contracted these troublesome vaccinal lesions on their hands and arms which called for treatment, that attention was drawn to the underlying cause. In Kaiser's opinion, cowpox is probably far more common than people believe. The number of cows involved in the individual outbreaks investigated by him was often considerable and in view of the disturbance to the milk trade and the troublesome vaccinal affections to which the milkers were exposed, steps were taken to vaccinate cows on a large scale with ordinary vaccine lymph. This measure had excellent effects in reducing the prevalence of the disease in farms formerly infected as also of the associated milkers' lesions.

Frankel's* experience of cowpox in Holland as related to the International Veterinary Congress in London in 1930, was very similar. He gives an interesting description of five outbreaks of cowpox at different places in the course of one year, but he is convinced, he says, that many more must be occurring in Holland which are deliberately concealed. The cowpox infections of the milkers were often very severe, the local lesions on the fingers, hands and face being accompanied by a feverish lymphangitis and axillary lymphadenitis. These lesions, which accompany cowpox infection in man, are of considerable interest from at least two points of view. In the first place, though it is usually possible to demonstrate by rabbit passage the "vaccinal" character of the commoner types of lesion, there occur certain types of the hard chronic cherry-red node which would seem to have an entirely different etiology and are possibly to be related to the peculiar paravaccinia lesions described by v. Pirquet in 1915 as occurring particularly in revaccinations and believed by him to be due to an entirely independent virus. Lipschütz investigated the histology of these peculiar nodes and found that the cherry-red colour was explained by the numerous thin-walled capillaries pervading the lesion. Moreover, the epithelial cells contain numerous acidophile inclusions giving a picture not unlike that of the fowlpox lesion with its Bollinger bodies. Kaiser was of opinion that certain milker's nodes encountered and investigated by him closely resembled the paravaccinia picture. Further work, however, is necessary on this subject, if the appropriate material can be secured. The other point of interest in these milkers' lesions of the frankly vaccinal types is the fact of their occurrence in vaccinated persons. Jenner, in his original *Enquiry*, made public the fact that cowpox, while giving protection against smallpox, did not always protect against itself and that milkers in association with cowpox were liable to repeated attacks of this disease. His contemporary, Pearson, promptly took up this statement of Jenner and concluded from his own observations and others communicated to him that certainly the local skin affection of cowpox might occur in the same person more than once, but he made the shrewd remark that it had still to be settled whether second attacks were accompanied by constitutional symptoms. We have here, as you will agree, the nucleus of allergy and the accelerated reaction. Kaiser also noted that vaccinated milkers were liable to contract cowpox lesions about the fingers, of

‡ *Z. f. Hyg.* **113.** 192. **115.** 687. *Arch. f. Dermat. u. Syph.* **169.** 77.

* *Trans. Eleventh Internat. Vet. Cong., London*, Vol. iii. p. 22.

the paronychial type, resembling those that occur, as is well known, in workers in institutions where vaccine lymph is produced.

Now in these quite recent outbreaks of cowpox in Austria and Holland, what evidence was there of association with recent vaccinia in vaccinated man? This question was very carefully looked into both by Kaiser and by Frenkel, but neither was able to assign a possible origin of any of these outbreaks in recent human vaccination. In spite of his absolutely negative findings in this respect it is remarkable that Frenkel expresses his adherence to the belief that most cases of natural cowpox are due to infection from newly-vaccinated men. One would think there was a sort of conspiracy to bolster up at all costs the conventional view that cowpox is not a disease *sui generis*. Personally I consider the matter entirely non-proven and so far as the epidemiological and circumstantial evidence in support of the secondary origin is concerned, it seems to me extremely weak. That cows and horses can be variolated with difficulty or vaccinated with ease cannot be used as a strong argument against the spontaneous origin of horsepox and cowpox if the circumstantial evidence is faulty and it is here that I approach, but only tentatively, a way out of this impasse, though much would depend on the securing of the necessary material from interested veterinarians. The mere fact that variola, cowpox and horsepox, can be made to throw off a type of variant possessing apparently similar properties—in fact, a sort of least common denominator which we designate vaccinia—in no way indicates identity of constituent antigen in the serological sense. The methods we have been able to apply so far to the determination of affinities between clinically allied viruses, such as cross-protection or mutual neutralisation of response with the corresponding antiviral sera, can at the best afford evidence only of some definite community of antigen. On this basis variola, cowpox and horsepox would be closely related, but I consider that the experimental evidence supporting affinities between variola-vaccine on the one hand and sheeppox and fowlpox on the other, is far from satisfactory. I have no experience of sheeppox, but so far as fowlpox is concerned my own work yielded no evidence whatever of cross-protection between vaccinia and this disease of the fowl. It is possible that antiviral serum, which is largely used in work of this kind, may bring to light only broad affinities between virus antigens, whereas immune sera prepared from the pure elementary bodies of these pock diseases and used in agglutination and agglutinin-absorption techniques, may yield much finer distinctions. The time, I think, is ripe for a great extension of this kind of work in elucidating affinities between viruses. Some years ago I was able to show that a serum which agglutinated the elementary bodies of vaccinia had no action on those of fowlpox and *vice versa*, thus confirming the negative results of cross-protection. Amies reported that the serum of the smallpox patient, while capable of agglutinating the elementary bodies of variola, had little or no action on those of vaccinia. On the other hand, monkeys hyperimmunised with variola antigen developed agglutinins in their sera both for variola and for vaccinia. With the aid of antiviral sera Sabin recently showed that some common partial antigen was possessed by that trilogy of viruses, herpes labialis, pseudorabies and the B virus. The subject, however, is quite young and it may be long before we are able to map the antigen mosaics of clinically allied viruses such as those we have been discussing, on lines so profitably followed of late in the Salmonella, Brucella and other groups. There is little doubt that while all these pock diseases may have evolved from a common source, some of them, like sheeppox and fowlpox, have become so adapted to particular hosts that the detection in them of a common partial antigen may be achieved only by careful serological analysis. It may perhaps be conjectured that the so-called "attenuated" variant known as Vaccinia stands towards variola in the sort of relationship to which the rough non-virulent but Vi. antigen-containing variant of *B. typhosus* stands in Felix's view, to its smooth virulent parent. For prophylaxis against virulent strains only the possession of a Vi. antigen would seem to be essential.

We need no longer suppose that the specific "vaccinia" antigen is identical in quality and distribution in the various "vaccinal" derivatives of natural pock diseases. We have indeed of late become too familiar with functional variations in the "vaccinia virus" itself—I may, for example, refer to the neuro-testicular variant—to make this assumption.

In conclusion, you will perhaps allow me a few reflections on some points which have struck me very forcibly while preparing material for this address to a section of comparative medicine. For my text I have gone back 140 years to the beginnings of those virus studies which in the last two decades have taken on a new life. What distinguishes the comparative pathologist of the present day from the pioneers of a century ago is the overwhelming advantage the former possesses in his armamentarium for the application of the experimental method. Supporting that armamentarium is the lore of the cell, with all that that implies, and the completely new outlook that the development of bacteriology gave to the enquirer trying to break fresh ground. These helps, our pioneers had to do without, but can we say that their work suffered very greatly in its

intrinsic value on this account? I think not. When one reads, for example, the masterly clinical studies of an infectious disease by men of the standing of Robert Ceely one cannot fail to be deeply impressed by their highly cultivated powers of observation, their capacity for reasoning from clinical premises and I might add, with envy, the leisurely preparation of their published work in English undefiled. I sometimes feel that the very facility of the experimental method in these modern times is too often reflected in the premature publication of undigested or misinterpreted experiment. On the other hand, too often the morbid anatomist and histologist fails to realise how necessary it is for him to apply the experimental method wherever possible if his work is to interest a generation that craves for experimental demonstration.

To define the scope of experimental pathology is no easy task, but at any rate the experimental pathologist—and would that there were more of them—can usually be recognised from his methods of attack on problems and an outlook that comes from constantly realising and satisfying the widest implications of experiment. I should like to leave with you some sentiments borrowed from Robert Ceely, Surgeon to the Buckinghamshire Infirmary, writing in the year 1842.

"The knowledge of the diseases of animals, when it becomes advanced, will contribute to diffuse new light on the diseases of man and perhaps bring to perfection methods of cure and prevention owing to the facility of multiplying on the inferior animals experiments which we cannot attempt on man. In the department of comparative pathology comprehending the exanthemata much remains to be accomplished, notwithstanding its diligent and successful cultivation in some parts of the continent since the time of Jenner. What has hitherto been effected there cannot suffice, however, to supersede, much less to paralyse, the efforts of his countrymen. But they must arouse themselves and no longer exhibit a practical indifference to the researches to which he so successfully devoted the energies of his great mind."

We can, I think, at a century's distance from Ceely's time, truthfully and thankfully say that the edifice whose foundation was laid by Jenner is still in the hands of the decorators.

. . . . .

Addendum.—The writer of this article would appeal to veterinarians and medical practitioners to keep a sharp outlook for lesions on the udders of cows that might possibly be of the nature of cowpox and for associated lesions on the hands of milkers. Evidence as to possible connection with vaccination of dairy personnel, etc., or with variola should be carefully sought, particularly at the very outset of such troubles among dairy cows. Professor Ledingham will be glad to test any likely material in the form of scrapings or discharges from teats or from milkers' lesions if such are sent to him promptly in sealed capillary tubes or on diphtheria swabs which have been previously moistened with sterile water.

The Veterinary Record

January 4th, 1936.

GREETINGS AND GOOD WISHES FOR THE NEW YEAR FROM THE PRESIDENT

The family of the N.V.M.A. is a large one and almost world wide. To the affiliated Associations, in Australia, New Zealand, South Africa, India, British Columbia, The Far East, Kenya, Southern Rhodesia, Northern Rhodesia, Uganda and Nigeria, may I, on behalf of the parent, convey the traditional but none the less sincere greetings of the season for a prosperous and successful year in 1936.

Of the problems facing these our affiliates one knows little, except that related by the constant stream of overseas veterinarians visiting our shores. If one were to single out South Africa, it merely would be because of the rapid strides made in that country in the sphere of preventive medicine and the knowledge one has of the good relationship existing between the district veterinary surgeon and the farmer.

At home, in the British Isles, if the "National" possibly could have a policy calculated to help all branches and groups, it surely would be that of fostering the expansion of preventive medicine. On all hands one hears the cry for more and more research workers, so that the position of this group seems secure in the years that are before us. Those of us who are in constant contact with the stock-owner, however, know full well that not one farmer in a hundred is availing himself to the full of veterinary science, let alone the fruits of modern research. A country which prides itself on being the stock-farm for the world cannot maintain that position without the help of the last word in veterinary science.

It is my view that the practitioner in these Isles can confidently look forward to a rapid expansion of preventive medicine, in which every man pulling his weight will have his due.

Our colleagues who are serving the Central Government and local authorities have a great responsibility to ensure a successful outcome to already organised preventive medicine. Local government, which has celebrated its centenary

in the year just past, has a goodly number of successes to its credit, so that veterinary officers can face the future with assurance. One ventures to hope that during the year the leaders of this group, with experience and foresight, may see fit to induce the Veterinary Officers' Association to seek affiliation with the "National," to the mutual advantage.

Our schools are full almost to capacity and it only remains for all members to put forward the maximum individual effort to secure the greatest collective benefit and the undoubted progress of our science.

My wife, who also was born into this great profession, joins with me in wishing all readers of *The Veterinary Record*, a happy and prosperous New Year.

J. R. Barker, *President.*

Hereford.
January 1st, 1936.

HUMAN ANTHRAX TREATED WITH NOVARSENOBENZENE

The findings of F. W. Gilbert, Government Medical Officer, Mongu, Northern Rhodesia, in a series of cases of human anthrax in Barotseland are summarised in *The Lancet* of December 7th, as follows:—

"Nine patients with pustular anthrax were treated with novarsenobenzene (neoarsphenamine) only. Seven of them made remarkable recoveries; the other two, aged one year and five years, died. The first of these was only brought to hospital on the sixth day of the illness, and was moribund on admission. The second responded to the second dose of novarsenobenzene, but developed a fatal ascites probably due to the toxic effects of this drug on the liver. The number of cases is too small to allow of comparison with other methods of treatment, but the results suggest that novarsenobenzene, if given within four days of the appearance of the pustule, will almost certainly cure the disease.'

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Clinical Communication

SOME EXPERIENCES OF PARASITIC TRACHEO-BRONCHITIS IN THE DOG, DUE TO *OSLERUS OSLERI*

E. W. ASCOLI, M.R.C.V.S.,
Barnstaple.

A series of cases of *O. osleri* infestation, coming directly or indirectly from a kennel of Cairns, was studied, and attempts at treatment were made.

Case 1. *Subject.*—Nine months' old Cairn bitch, in a kennel of about twenty.

History.—Chronic cough since the age of five months, which was greatly increased by excitement, but generally absent during quiet exercise. The appetite was poor and variable, but the bitch was always lively and never listness.

Examination.—March, 1934. The respiratory symptoms consisted of attacks of violent coughing, each ending in an apparently unsuccessful attempt to bring up bronchial discharge. Marked dyspnœa was a frequent accompaniment. On auscultating the chest over the division of the trachea, a whistling sound was obvious. While the bitch was lying down, or asleep, a wheezing sound could be heard several feet away.

The bitch was thin, but not emaciated. The temperature was normal.

Diagnosis.—Chronic bronchitis.

Treatment.—The administration of respiratory sedatives and expectorants gave no relief, but when warm weather arrived in May, the coughing disappeared completely for a few weeks, although treatment had been discontinued. The bitch also increased in weight, and her appetite improved.

She was mated, and whelped on July 24th. Coughing recommenced a fortnight later.

About this time, her brother (same litter) was brought to be destroyed on account of a chronic cough of seven months' duration. The autopsy on this dog (whose symptoms were similar to those of the bitch) showed infestation with *Oslerus osleri*. It seemed probable, therefore, that the subject of Case 1 was suffering from the same disease.

The bitch's fæces were examined for ova and larvæ, but the result was negative.

Two intratracheal injections, each consisting of 2 c.c. of an emulsion of oils of chenopodium and turpentine, in 5 per cent. phenol, were given, with an interval of a week between. No good and no harm resulted. The bitch was then destroyed.

Post-mortem examination.—The only macroscopic abnormalities were present in the respiratory system.

Small, rounded, sessile nodules, ranging in diameter from 2 mm. to 6 mm., were observed in the following positions :

(*a*) One in the middle third and one in the lower third of the trachea, on the dorsal surface.

(*b*) Three nodules, 4 mm. in diameter, and several smaller ones, obstructing the opening of the left bronchus.

(*c*) Two 3 mm. nodules in a similar position in the right bronchus.

A solitary specimen of *Oslerus osleri*, 6 mm. in length, was lying partially buried in one of the nodules.

Case 2. *Subject.*—Cairn dog, brother to the subject of Case 1, and from the same litter.

History.—Chronic cough for seven months, *i.e.*, since the age of five months.

Examination.—Bodily condition good. Temperature normal. The symptoms—chronic cough, dyspnœa, whistling and wheezing—were similar to those exhibited in Case 1.

The dog was destroyed.

Post-mortem examination.—Abnormalities were confined to the respiratory system.

The lower dorsal surface of the trachea was covered by tiny confluent nodules.

The entrance to the right bronchus was obstructed by two irregular nodules, 6 mm. long and 3 mm. wide. The left bronchus was similarly obstructed by two round ones, 6 mm. in diameter, in one of which were lying 15 half-buried specimens of *O. osleri*.

The third bronchus was obstructed by five tiny nodules.

The left middle lobe possessed on its surface a tough, fibrous area, circular in outline, 1 cm. in diameter and 2 mm. deep.

Case 3. *Subject.*—Fourteen months' old Cairn dog.

History.—The dog was purchased at the same kennels one month before symptoms developed. Violent coughing commenced with dramatic suddenness.

Examination.—(One month after onset of symptoms.)—Bodily condition good. Temperature normal. Coughing and dyspnœa as in other cases, but wheezing was not heard and on auscultation of the chest the whistling was only slight.

Fæcal examination positive for larvæ.

Treatment.—Two intratracheal injections were made with an interval of seven days, each consisting of 1 c.c. of 5 per cent. phenol in water.

Result.—The cough was improved after the first injection, and very much improved after the second. Except for a violent attack 14 days afterwards, coughing was heard only occasionally during the next six weeks. The symptoms then suddenly recurred. A further injection, however, was again followed by disappearance of the symptoms, and since then the cough has seldom been noticeable (*i.e.*, during the following eight months).

Case 4. *Subject.*—Twelve months' old Cairn bitch, at the same kennels.

History.—For the past six months, the bitch was under-weight and her appetite poor. A slight cough had been noticed four to five months ago, but this had disappeared. Four weeks ago, coughing, wheezing and dyspnœa, had begun, just as in the other cases.

Examination.—The above-mentioned symptoms were very severe. A loud whistling sound was heard on auscultating the chest over the division of the trachea.

Fæcal examination, negative.

Treatment.—One c.c. of 5 per cent. phenol intratracheally, followed in a week by an injection of 2 c.c. of 10 per cent. phenol. Improvement occurred immediately after the second injection, and, apart from a severe attack of coughing of a few hours' duration, 14 days later, the respiratory symptoms disappeared for two months. The symptoms then returned. During this period, however, appetite was improved, and weight markedly increased. She was then three weeks pregnant.

A third injection of 1 c.c. of 5 per cent. phenol was made into the trachea. Since then, the bitch has been perfectly well and to-day (eight months later) no respiratory abnormality is ever noticed.

Case 5. *Subject.*—Twelve months' old Cairn bitch.

History.—The bitch was purchased at the kennels eight months ago. Severe coughing and wheezing commenced two months ago.

Examination.—Respiratory symptoms very marked. Intrathoracic whistling sound present. Bodily condition fair, appetite good.

Fæcal examination, negative.

Treatment.—1 c.c. of 5 per cent. phenol by intratracheal injection. Five days later, symptoms were improved. A second injection was made on the seventh day. Thereafter the cough was very slight until two months later, when it was as bad as ever. A third injection of 1 c.c. of 5 per cent. phenol was made. This was followed by improvement, which was maintained. An occasional cough is now heard (eight months later).

Case 6. *Subject.*—Eighteen months' old Cairn bitch, at the same kennels.

History.—Severe coughing, wheezing and dyspnœa for six weeks.

Examination.—In fat bodily condition. Appetite good. Fæcal examination, positive for larvæ.

Treatment.—Injection of 1 c.c. of 5 per cent. phenol was followed by improvement. The injection was repeated in six days.

Death from acute broncho-pneumonia occurred 20 hours later.

Post-mortem examination.—(See photograph.) Acute broncho-pneumonia.

One small nodule in upper half of trachea, 25 in lower half. Some were confluent, forming nodules 2 cm. by 0·5 cm. All were on the dorsal surface.

All the bronchi were obstructed, the lumen of each being almost completely obliterated.

Fifteen specimens of *O. osleri* were lying free in the lumen of the trachea. Approximately 120 were lying partially or completely buried in the nodules.

No other abnormalities were seen.

Case 7. *Subject.*—Six months' old Cairn dog, son of the subject of Case 1. In contact with Cases 1, 3, 4, 5 and 6.

History.—Suddenly developed slight wheezing and coughing and made attempts at expectoration.

Examination.—Respiratory symptoms mild, but the pup was breathing through the mouth. Temperature normal. Appetite good.

Fæcal examination was not made.

Treatment.—Four days after commencement of symptoms, an injection of 0·7 c.c. of 10 per cent. phenol was made.

Pneumonia developed, the temperature being 106·5° F., four hours later. Recovery occurred, the breathing and temperature being normal in five days. During this period, coughing was not heard. On the seventh day, dyspnœa began again and became rapidly worse, death occurring from asphyxia ten hours later.

A quarter of an hour before death, 1 grain of ephedrine hydrochloride was injected intramuscularly.

Post-mortem examination.—Acute pneumonia.

Oedema of the larynx, the cavity being obliterated.

No nodules or worms were seen.

The trachea and bronchi were widely dilated (owing to the ephedrine).

(Presumably the worms, probably immature, were killed by the injection and subsequent inflammation.)

Case 8. *Subject.*—Three years' old Spaniel bitch.

History.—In contact with all the above cases except No. 1.

Slight choking cough with attempts at expectoration. Heard occasionally for a period of two months before treatment was adopted.

Examination.—The bitch was in fat condition, appetite good, and temperature normal. Fæcal examination was not made. No intrathoracic wheezing or whistling.

Treatment.—One intratracheal injection of 1 c.c. of 5 per cent. phenol.

Result.—Complete recovery. No recurrence eight months later.

. . . . .

Technique of the Intratracheal Injection.—The dog is slightly narcotised with morphine and is placed on its back with the head extended, so that the trachea is tense. An area ½ inch below the larynx is shaved and disinfected. A hypodermic needle is pushed through the skin and tracheal wall with one thrust, its direction being downward and its position, the mid-line. When the needle is in the correct position, air can be heard rushing through it.

The warmed solution is then slowly injected, and the dog is held with the head higher than the chest.

Discussion.

The above case reports have brought to light the following facts :—

(1) Cases of *O. osleri* infestation can be cured, or the symptoms improved to the point of disappearance, if the disease is not too advanced. (Of seven cases treated, two died in consequence, one—an advanced case—was destroyed, two recovered completely and two are very much improved—these still giving an occasional cough.) Of the two that died, one was probably too advanced to recover, while the other might well have recovered if a less concentrated solution had been injected.

(2) Symptoms may not occur until eight months after exposure to infection.

(3) Examination of fæces for ova or larvæ by a parasitologist, is not a reliable method of diagnosis. (It has not been possible to collect sputum for this purpose.)

Acknowledgment.—The writer wishes to tender his grateful thanks to Mr. E. L. Taylor, B.Sc., M.R.C.V.S., D.V.H., for examining the specimens of fæces.

ADDENDUM, by E. L. TAYLOR

Attempt to Produce *Oslerus* Infestation by Feeding Possible Intermediate Hosts to Puppies

In connection with Mr. Ascoli's report on a series of cases of severe *Oslerus* infestation, it is of some interest to note that with a view to elucidating the life history of the worm, a number of small invertebrates, possible intermediate hosts, were collected from the infected premises on March 3rd, and fed on the following day to four puppies at the Ministry of Agriculture's Veterinary Laboratory. These possible intermediate hosts comprised 50 slugs, one snail, one ground beetle, three click beetles, one dipterous larva, one ground caterpillar, 19 wood lice and four earthworms.

Infected fæces and slugs and snails fed in the laboratory on leaves contaminated with infected fæces, also gave negative results.

The puppies were killed on October 18th, but no trace of *Oslerus* infestation was found.

DETERMINATION OF IODINE IN BIOLOGICAL SUBSTANCES

" Iodine plays an important part in the metabolism of the body," says *Nature*. " Since it is present in the molecule of thyroxine, the hormone of the thyroid gland, the normal level of metabolism in warm-blooded animals is only maintained when this gland secretes into the bloodstream for distribution throughout the body adequate amounts of thyroxine. The removal of the iodine atoms from thyroxine leaves a compound which has none of the specific activity of the former substance. Iodine is therefore an important constituent of the diet, but the amounts found in natural sources are exceedingly small and difficult to estimate. The need of a reliable method of estimation is shown by the facts that the incidence of goitre in different regions is related to the iodine content of foodstuffs and the water supply, and that in the converse condition of hyperthyroidism, the blood content of iodine is much greater than normal. C. O. Harvey has recently published the results of an investigation, carried out under the auspices of the Medical Research Council, into methods of estimating minute amounts of iodine, together with a description of a standardised reliable method, based on Hurtley's modification of Von Fellenberg's procedure (Special Report Series No. 201. London: H.M. Stationery Office, 1935. 1s. 0d. net). Briefly, the method consists in the digestion of the material with caustic potash, followed by ignition in a nickel dish and extraction of the alkaline mass from the carbon with water. The iodide is extracted with alcohol, oxidised to iodate with bromine water, and the iodine, liberated by addition of potassium iodide, titrated in the usual manner with sodium thiosulphate. Nitrite is destroyed by addition of sodium azide before the oxidation with bromine. Harvey gives full details for carrying out the process, including the methods of preparing the reagents. With strict attention to all the details of the process, the method has given comparable results in the hands of different workers."

Abstracts

[**Chronic Equine Arthritis.** Way, C., and Hoffman, G. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 4. 508-518. (37 refs.)]

Chronic arthritis in man and the horse is considered to be essentially similar in nature; in both there are lesions in various joints which are merely local manifestations of a general infection. In humans, streptococci have been shown to play an important part and alimentary infection is estimated by most workers to be responsible for 90 per cent. of the cases. In the horse a variety of organisms are incriminated and the author claims that infection from the digestive tract is responsible for an even higher percentage of cases than in man and that intestinal parasites carry the bacteria with them on their wanderings, transporting them in the blood stream to be deposited in various parts of the body, where they grow and set up arthritic lesions. Previous workers have recovered *Shigella equirilis* [*B. viscosum equi*] in pure cultures from joint cavities of foals, the organisms being a common inhabitant of the alimentary tract of horses. Similarly, numerous strains of staphylococci, streptococci and other organisms are frequently found in infected cases, the lesions due to them in various organs of the body serving as foci of infection supplying the bacteria commonly found in arthritis.

Four hundred and sixty samples of blood from horses showing various clinical symptoms of disease were examined by a complement-fixation method devised by one of the authors, details of which are not given. In 17 per cent. of the samples a positive reaction to *B. pyocyaneus* was obtained, in 38 per cent., to an organism which the authors have called "viscid rod" (belonging to the same family as the Friedlander bacillus), whilst 69 per cent. of the cases reacted to various species of staphylococci and 95 per cent. to one or more of the seven or eight species of streptococci isolated from horses. No direct examination of material was carried out in an endeavour to recover these various organisms from adult animals suffering from arthritis, but it is considered that the results of the complement-fixation test are supported by the findings of previous workers in experimental animals and in the human subject.

The treatment used consisted in subcutaneous injection of vaccines prepared from the organisms claimed to be present, the dose being proportional to the degree of infection suggested by the complement-fixation test. Ten cases of infections such as joint-ill, navel-ill, etc., were treated in young animals and satisfactory and permanent recovery is considered to have re-

sulted. By far the majority of the cases in which vaccines were given consisted of arthritis manifested by joint enlargement, shifting lameness, etc., and included many race-horses. Marked improvement is claimed in many cases in less than 30 days and the animals are said to have recovered satisfactorily and subsequently to have won important races. A few cases of pre-natal infection were also studied in which the foal showed evidence of acute infection very soon after birth and here the dam and foal usually reacted to the same organism. Finally, a few cases of chronic foot lameness comprising side-bones, ring-bones and navicular disease were treated on the assumption that these cases, too, are due to infection. Radiographs showed an active arthritis to be present. Insufficient numbers have been treated to justify any general conclusions, but it is considered that the results are in some cases satisfactory.

An appeal is made for the use of methods of treatment which are directed at the cause of the disease rather than those which employ the "barbarous tortures" of firing and blistering. In at most 10 per cent. of cases can the latter type of empirical treatment be of service—by causing the animal to undergo a period of enforced rest.

[In 1928 Hare[1] described his studies on 147 horses, of which 14 per cent. showed lesions which he considered similar in nature to those of human rheumatoid arthritis. Bacteriological examination failed to identify the causal factor. The pathological changes in the affected joints were described, the primary changes consisting in an inflammation of the vascular connective tissues. Mitchell[2] suggested that shivering and grunting, stringhalt and jinked back were associated with an osteo-arthritis of the intervertebral joints and that the exostosis produced might press on the spinal nerves as the latter emerge from the vertebræ. In a second paper[3] the same worker was unable, in three animals affected with shivering, to find exostosis which could cause such effects. Strongyle invasion appeared to be a feature common to all the animals. Williamson and Mitchell[4] recorded a further case of shivering accompanied by arthritic lesions and here again there was evidence of a verminous aneurysm of the anterior mesenteric artery. Finally, the latter investigator[5] gives a summary of eleven cases of shivering and five cases of jinked back, the lesions consisting in an osteo-arthritis and a diffuse interstitial neuritis of certain nerves. Altered vascular supply is suggested as being the initial cause of the lesions, this being brought about by the action of some, as yet unknown, toxic agent. All the above-mentioned papers point to chronic arthritis of non-specific type as being merely a local manifestation of a general disease.

In the paper by Way and Hoffman the problem is attacked from a different angle—serological diagnosis followed by vaccine treatment of the living animal. The results of this work must be accepted with reserve since no attempts were made at isolation of the causal organisms from the affected animals. It would appear doubtful whether the degree of reaction of an animal to the complement-fixation test is an accurate measure of the extent of infection (or of immunity, for that matter). The problem of the ætiology, and therefore the treatment, of the disease is not yet sufficiently understood. Clinical, serological, bacteriological and histological data of affected animals, coupled with a study of a sufficient number of control animals, are needed. Again, bacteria are not the only important factor in a bacterial disease—the host (the soil) is at least as important as the parasites (the seed). Heredity may play an important part. Strongyles may possibly be the means by which the organisms gain their predilection sites in the joints or they may act merely by lowering the animal's resistance.]

[1]Hare, T. *Vet. Rec.* 1927. 411. 431.
[2]Mitchell, W. M. *Ibid.* 1930. 89.
[3]Mitchell, W. M. *Ibid.* 1930. 535.
[4]Williamson, G., and Mitchell, W. M. *Vet. Rec.* 1931. 412.
[5]Mitchell, W. M. *Vet. Rec.* 1933. 918.

E. G. W.

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[The Place of the Whole-blood Test in a Pullorum Disease-Eradication Programme. Lubbehausen, R. E., and Beach, T. R. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 5. pp. 620-634. (2 refs.)]

From the data presented it is apparent that the whole-blood (stained antigen) test is not yet sufficiently reliable to permit of its exclusive use in the eradication of pullorum disease. The authors consider that the test should not receive official recognition until its efficiency is equal to that of the slow tube method.

The whole-blood test was carried out on 14 groups of birds on five farms (a total of 91,779 birds), of which 42,214 were also tested by the slow tube test. The degree of efficiency of the two methods of testing is shown by a comparison of the test results and autopsy findings on the 405 birds removed as reactors. Under field conditions the rapid whole-blood test only showed an efficiency of 38·71 per cent., while under laboratory conditions it gave an efficiency of 76·5 per cent. The slow tube test showed an efficiency of 99·53 per cent.

Repeated testing at short intervals did, however, reduce the number of infected birds in the various flocks to 1 per cent., and it is therefore of value in preparing flocks for a final

test by the slow tube method. Such supplementary use of the whole-blood test would relieve official testing laboratories of the burden of preliminary testing and would be less expensive; but it is important that the whole-blood test be conducted or supervised by trained persons. The progeny of groups of fowls that gave negative results to both methods of testing were free from pullorum disease.

R. F. G.

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[**Spontaneous Hydronephrosis in the Dog, with Osteoid Tissue in the Renal Pelvis.** Olson, C. (Jun.).(1935.) *J. Amer. Vet. Med. Ass.* **87.** 1. 74-80. (5 figs., 12 refs.)]

The author describes a case of unilateral hydronephrosis in a dog due to obstruction of the ureter at or near its origin at the renal pelvis. The cause of the obstruction was not apparent, but was possibly a congenital malformation or stricture. The right normal organ weighed 53 grammes, whereas the left hydronephrotic kidney contained 1,100 c.c. of turbid yellowish-brown fluid and weighed 1,200 grammes. An unusual feature of the case was the fact that the much-dilated renal pelvis contained a hard plaque-like structure which was found histologically to be composed of osteoid tissue. The latter, except for one small area, contained no calcium salts. A cavity lined by epithelium resembling that of the renal pelvis occupied the centre of the plaque and it is suggested that the osteoid tissue may have originated by metaplasia of the sub-epithelial connective tissue elements into osteoblastic cells.

E. G. W.

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[**The Occurrence of Gastric Ulcers in Sea Mammals of the Californian Coast, their Etiology and Pathology.** Schroeder, C. R., and Wegeforth, H. M. (1935.) *J. Amer. Vet. Med. Ass.* **87.** 3. 333-342. (8 figs., 1 table, 4 refs.)]

The stomachs of native and captive seals and sea-lions (46 animals in all) were studied for the presence of gastric ulcers. In all cases in which ulcers were found worms were present and these are believed by the authors to be responsible for the continued irritation, if not for the primary excitation of the ulcers. The stomachs of native seals contained, in addition, sharp stones used for trituration of the food. In the captive seal the stomach wall is thinner, due to the absence of chronic parasitic irritation, and in these animals after short periods of captivity perforation has been found, arising, it is believed, from fresh activity of existing chronic ulcers. The buffering chronic irritation of the parasites having been lost in captivity, but rough, sharp stones still being present, a chronic ulcer may become an acute and even a perforating one.

It is concluded that gastric ulcer will not result in the extinction of the native seal but that fatalities are too few to lead to an inherited immunity due to survival of the fittest.

E. G. W.

Report

CITY OF SALFORD

WORK OF THE VETERINARY DEPARTMENT, 1934-35

The work of the City of Salford Veterinary Department consists of:—

(1) Administration of the Diseases of Animals Acts and Orders.

(2) Supervision of the Milk Supply.

(3) Inspection of Meat and other Foods.

It is pointed out that much work of a preventive nature is done in connection with the Diseases of Animals Acts, and which cannot be adequately expressed in figures. Several cases of suspected outbreaks of scheduled diseases were investigated, but all proved negative with the exception of 17 cases of swine fever which necessitated the destruction of 139 carcases.

Salford is an important distributing centre for Irish cattle and during the year 1,729 licences were issued authorising the movement of 13,883 cattle and 34,050 sheep.

The following prosecutions were taken under the Diseases of Animals Acts:—

(1) Animals (Landing from Ireland, Channel Isles and Isle of Man) Order of 1933, Article 30 (moving cattle from certain premises in Salford without a licence during the prescribed period of detention).

(2) Lancashire Swine Fever Infected Area Order of 1933 (unlawfully permitting swine to stray upon certain highways in the city).

(3) Transit of Animals (Amendment) Order of 1931, Article 1 (failing to cleanse and disinfect a motor vehicle used for the transit of animals).

In the section dealing with the milk supply, the percentage of tuberculous milk samples is similar to that for previous years, namely, 8·2. The total number of samples examined was 465.

One of the samples found positive was a sample of "Certified" milk and the subsequent inspection at the farm resulted in two cows being found having tuberculous udders, out of a herd of 38.

The inspection of the herds giving tuberculous milk resulted in 45 cows being dealt with under the Tuberculosis Order by the respective local authorities.

There are 775 registered retailers of milk in the city, of whom 592 are registered for the sale of bottled milk only.

Grade "A" (T.T.) milk, Grade "A" milk and "Pasteurised" milk are supplied to the city hospitals and institutions. The farms producing the milk are inspected and supervised by the veterinary inspector.

There are seven private slaughterhouses and one public slaughterhouse in the city. During the year 25,961 animals were killed in the slaughterhouses, and a total of 35 tons, 19 cwts. and 2 qrs. of meat was condemned, 55 per cent. of which was affected with tuberculosis.

The supervision of retail meat shops, bakehouses and all food preparing premises is carried out by the veterinary inspector.

THE ORIGIN OF MILK SUGAR

The Lancet of November 30th, 1935, refers to the striking observations on the production of the milk sugar, lactose, by the active mammary gland recorded by Grant. Previous physiological evidence had strongly suggested that the lactating breast was capable of extracting glucose from the blood and of converting it into lactose. The present work, which took the form of a study of the synthesis of lactose by active gland *in vitro*, provides further evidence. Slices, 0·5 mm. thick, of the mammary glands of freely lactating guinea-pigs were kept aerated in physiological salt solutions for six hours at body temperature. "It was found that when glucose was present lactose synthesis occurred, the gland tissue producing this sugar in amounts equal to 2 to 4 per cent. of its own weight. (Probably the actual synthesis was considerably greater than this, since in control experiments lactose was found to disappear from the gland.) Although lactose consists of glucose condensed with galactose, the addition of galactose alone to the gland tissue did not result in lactose synthesis. Hence, whilst the galactose part of the lactose can be formed from glucose, the glucose part cannot be formed from galactose. Further, it appears that galactose can be formed from glucose only when it is to become a part of the lactose molecule. . . .

"Nitzescu found that in the fasting animal the lactose content of the milk was lowered, but the normal level was restored by the injection of glucose, galactose, fructose and maltose. His experiments could not show whether the last three sugars were converted into lactose directly, or only after preliminary transformation into glucose. In the new experiments Grant has found no definite lactose synthesis from galactose, fructose, and mannose, but the question is still not answered. For the mechanism by which these sugars are converted into lactose in the gland, if it exists, might be damaged under the artificial conditions *in vitro*, whilst the synthesis from glucose might rest on a more stable mechanism. Such considerations as these must always be borne in mind to avoid the dangers of attempting to apply to the living animal what is found to happen in the flask. These dangers are increasing now that many stimulating results are being obtained with the tissue-slice technique; such, for example, as those obtained by Krebs on urea and ammonia formation. The present work, however, is at the worst an interesting *in vitro* demonstration of a sugar inter-conversion; whilst, on the other hand, it may be of considerable physiological significance."

N.V.M.A. Divisional Reports

DUMFRIES AND GALLOWAY V.M.A.*

ANNUAL MEETING AT DUMFRIES

The Annual General Meeting of the above Division was held at the Station Hotel, Dumfries, at 12 noon on Tuesday, November 19th, 1935. The chair was occupied by the President, G. D. W. Davidson, Esq., Castle Douglas, and the following other members were present: Messrs. J. Allan, A. Gibb, Alex. Gibson, A. J. Kennedy, W. L. Mackenzie, A. J. Milligan, John Reid, R. Simpson, A. Young and George A. Sangster (Hon. Secretary).

Messrs. S. J. Edwards, the Hannah Dairy Research Institute, Ayrshire; W. Watt, Ministry of Agriculture and Fisheries, Glasgow; and David Wyper, Dumfries, were present as visitors.

The minutes of the last meeting, having been published, were taken as read.

Apologies for absence were received from Messrs. F. A. Davidson, A. Edgar, Dr. J. Russell Greig, Messrs. W. T. Hewetson, P. McKinlay, R. Craig Robinson, W. G. Robinson, W. Scott, T. W. Woodhead and W. Jackson Young.

Nomination of New Members.—Mr. W. Watt, of the Ministry of Agriculture and Fisheries, Glasgow, proposed by Mr. G. D. W. Davidson, seconded by Mr. A. Young; Mr. David Wyper, Dumfries, proposed by Mr. A. Young, seconded by Mr. A. J. Milligan; and Mr. J. C. Bennison, Carlisle, proposed by Mr. R. Simpson, seconded by Mr. J. Reid.

Financial Statement.—The Hon. Treasurer submitted a statement on the financial position of the Division for 1934-35. On the motion of Mr. A. J. Milligan, seconded by Mr. A. Young, it was agreed unanimously that the total sum accumulated in the Special Fund for the year 1934-35 be paid to the Division's representative on the Council of the N.V.M.A. Mr. G. A. Sangster moved that the annual subscription to the Victoria Veterinary Benevolent Fund be increased this year by one guinea, and this was agreed upon.

Election of Office-Bearers

The following gentlemen were unanimously elected office-bearers for the ensuing year:—

President.—Mr. W. Scott, Penrith.

Vice-President.—Mr. G. D. W. Davidson, Castle Douglas.

Hon. Secretary and Treasurer.—Mr. G. A. Sangster, Dumfries.

* Received for publication December 18th, 1935.

Branch Representatives.—The President or his nominee and the Hon. Secretary.

Johne's Disease.—The Secretary reminded the members of the replies regarding Johne's disease which were expected by the Department of Agriculture for Scotland.

Correspondence.—(1) From the Secretary of the N.V.M.A. regarding arrangements at horse race meetings and dog shows. After hearing this letter it was decided to let the matter drop in the meantime.

(2) From the Secretary, N.V.M.A., enclosing Report of the Special Committee on Fur-bearing Animals. This was published in *The Veterinary Record*.

(3) From the Secretary of the N.V.M.A. regarding fees (Accredited Herds Scheme). This being of no importance to the members of this Division, it was passed over.

(4) From the Secretary of the N.V.M.A. regarding the report and correspondence which had passed between the Research Council and the N.V.M.A. in connection with investigation into braxy-like diseases of sheep. This correspondence and report were published in the April 13th issue of *The Veterinary Record*.

Expenses of Representatives.—The question of payment of expenses incurred by Branch and Divisional representatives in attending meetings of the National Veterinary Medical Association was considered further. The Secretary was instructed to communicate the dissatisfaction of the meeting with the opinion expressed by the Finance and General Purposes Committee in this matter.

Next Meeting.—It was agreed to hold the next meeting at Carlisle. The Secretary was instructed to ask Dr. Bullock if he would address the meeting.

Paper.—At the conclusion of the meeting the members and visitors lunched, after which a paper was read by Mr. S. J. Edwards, M.R.C.V.S., of the Hannah Dairy Research Institute, on "Bovine Mastitis." This paper will be published at a later date. Following the reading of the paper all members present participated in a lively discussion.

Votes of Thanks.—On the call of the President, a hearty vote of thanks was accorded to Mr. Edwards for his very able paper.

Mr. Young moved a formal vote of thanks to the retiring President for his generous services to the Division during his year of office, which was heartily accorded.

Geo. A. Sangster, *Hon. Secretary.*

Popular Breeds of Poultry.—The National Poultry Council states that in officially recognised laying trials in 1935 there competed 9,957 Rhode Island Reds, 4,012 White Wyandottes, 3,502 White Leghorns, 1,929 Light Sussex, and 709 Black Leghorns.

MID-WEST DIVISION N.V.M.A.*

MEETING AT SWINDON

There was a representative attendance at a meeting of the Mid-West Division, N.V.M.A., held at the Great Western Hotel, Swindon, on October 8th, 1935, with the President (Mr. T. J. Margarson, of Stroud) in the chair.

The following members were also present: Messrs. J. J. Aveston, E. Brown, J. C. Coleman, C. Golledge, L. St. Bel Golledge, J. R. Hewer, R. Moore, S. H. Pettifer, C. J. Pugh, W. R. Watson and C. E. Perry (Hon. Secretary). Messrs. T. Dalling, P. R. Leckie, J. Richardson, D. Sherbrooke and F. J. Taylor attended as visitors.

Apologies for unavoidable absence were received from: Sir Frederick Hobday, Professor Wright, Messrs. T. J. Brain, W. D. Rees, C. J. S. Powell, J. Brain, J. R. Barker, C. Adams, F. J. Eardley, Dr. Scott, Messrs. J. R. Baxter, A. J. Baxter and W. A. Austin.

Paper.—Major T. Dalling, of Beckenham, Kent, read a paper on "Immunisation: Its Practical Application in the Control of Animal Diseases (Preventive and Curative)," the discussion being opened by Captain J. C. Coleman, of Swindon. [Major Dalling's paper, and a report of the discussion which followed its presentation, are reproduced at the commencement of this issue.—*Editor.*]

Vote of Thanks.—The President proposed a hearty vote of thanks to Major Dalling for his scientific paper, observing that he was quite certain that all had learned something from the paper and discussion.

This was seconded by Mr. J. J. Aveston, who said that it was most kind of Major Dalling, busy man that he was, to come there and read them a paper of such great interest. They all knew that Major Dalling was one of the most eminent amongst veterinary research workers, and he had the added attribute of being able to convince and make simple what he had to say, however difficult the subject.

C. E. Perry, *Hon. Secretary.*

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* Received for publication November 27th, 1935.

Dorset Gold Tips.—One of the reserve champion pigs at the Smithfield Club's Show was described as a cross between a Large White and a Dorset Gold Tip. "What is a Dorset Gold Tip?" asks the Editor of *The Farmers' Weekly*. "I am not sure of its antecedents, but the breed looks to me like the progeny of a Berkshire and Tamworth. This cross gives the tortoiseshell colouring seen on the Dorset Gold Tip. It may be a useful type of pig, but do we really want any more breeds of pigs established in this country?"

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Jan. 6th.—N.V.M.A. Committee Meetings.
Jan. 7th.—N.V.M.A. Council and Committee Meetings.
Jan. 8th.—R.C.V.S. Committee Meetings. V.V.B.F. Council Meeting.
Jan. 9th.—R.C.V.S. Committee Meetings.
Jan. 10th.—R.C.V.S. Committee and Council Meetings.
Jan. 13th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.
Jan. 17th.—Annual Meeting of the Mid-West Division, N.V.M.A., at Bristol, 2.30 p.m.
Jan. 17th.—Meeting of the Southern Counties Division, N.V.M.A., at Winchester, 2.30 p.m.
Jan. 17th.—Ladies' Guild Dance in aid of the Victoria Veterinary Benevolent Fund, Princes' Galleries, Piccadilly, W.
Jan. 25th.—Meeting of the Scottish Branch, N.V.M.A. at Perth.

Sept. 14th-18th.—N.V.M.A. Annual Congress, Scarborough.

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PERSONAL

Lady Hobday

The fact that in our last two issues we have had to record the critical condition of Lady Hobday following upon the serious head injuries she sustained through being knocked down by a motor-car in Kensington just before Christmas, renders it all the more gratifying to us to be able to state that at last a definite, though very slight, improvement is perceptible to her medical attendants. We understand that they do not now altogether despair of Lady Hobday's recovery, and our readers will share our earnest hope that this improvement may become more marked and the continuing deep anxiety as to her condition removed.

New Year Honours

The veterinary profession is represented in the New Year Honours List issued on January 1st, 1936, by Major Grahame Williamson, R.A.V.C., Deputy Assistant Director of Veterinary Services, Baluchistan District, India, who receives the Order of the British Empire (Military Division).

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Appointments

Gloucestershire's Chief Veterinary Officer.—Mr. James Turnbull Taylor, M.R.C.V.S., District Veterinary Officer to Cheshire County Council, has been appointed Chief Veterinary Officer to Gloucestershire County Council. Mr. Taylor was appointed whole-time officer with Cheshire County Council in October, 1933. He has taken an active interest in agricultural affairs in Cheshire, and for several years has been hon. veterinary surgeon to Middlewich Agricultural Society, a member of Winsford Branch of the National Farmers' Union, and a vice-president of Middlewich Young Farmers' Club—one of the most progressive in Cheshire. Mr. Taylor is a vice-president of Winsford Branch of the British Legion, and a member of the John Brunner Lodge of Freemasons.

Captain A. H. Hunter, B.V.Sc. (Toronto), M.R.C.V.S., D.V.S.M., has been appointed Assistant Veterinary Inspector by the Nottingham County Council. Captain Hunter has had an all-round experience at home and abroad amongst all classes of stock; graduating in Canada, he served through the Great War and later, having graduated M.R.C.V.S. at London and taken his D.V.S.M., was appointed, on the recommendation of Colonel Young, to be a Veterinary Meat Inspector in Chili, a position he occupied for four years. On the termination of his contract, he was appointed manager of one of the frigorificos and has just relinquished that position for domestic reasons.

Births.—On December 17th, 1935, at Marlborough House, Reading, to Elsie Mary, *née* Carter, wife of Hugh Curtis, a son.

On December 21st, 1935, to Mr. and Mrs. J. G. Wright, 27, Ashley Lane, Hendon, a daughter.

Presentation to Professor O'Connor

At a pleasing ceremony on December 24th, the members of the staff of the Veterinary College of Ireland, Dublin, presented Professor J. J. O'Connor, M.R.C.V.S., the new Principal of the College, with a silver tea set as an expression of their good wishes.

The presentation was made in the College by Professor T. G. Browne in the presence of members of the College staff and a number of past students.

Professor Browne, paying tribute to the new Principal, referred to the fact that he had been a member of the staff for 33 years. It was only reasonable that Professor O'Connor should now find himself head of the institution which he had been serving efficiently and faithfully. The relationship amongst their members under their late Principal, Professor Craig, always had been most harmonious, and there was every reason to believe that the new Principal would receive the same loyalty and co-operation. They offered him their heartiest congratulations.

Professor O'Connor returned cordial thanks for the presentation.

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R.C.V.S. OBITUARY

Barker, Robert, Witham Avenue, Eaglescliffe, Co. Durham. Graduated Edinburgh, July 16th, 1896; died December 24th, 1935, aged 65 years.

Carless, John Richard, The Wood Cottage, Ford Heath, Shrewsbury. Graduated London, April 2nd, 1878; died December 25th, 1935, aged 78 years.

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GENERAL OBITUARY

Mr. William Gordon

In informing us of the death of Mr. William Gordon, O.B.E., late Chief Constable of Dumfriesshire, who passed away at Dumfries on Saturday

last at the age of 82 years, a correspondent writes: "Mr. Gordon, as Chief Constable of the County, was Chief Inspector under the Diseases of Animals Acts and Orders. He was held in very high esteem by the members of the veterinary profession, and, on his retiral in 1932, was made the recipient of a present in token of their high regard. Mr. George Gordon, M.R.C.V.S., District Veterinary Surgeon, Veterinary Department, Umtali, Southern Rhodesia, is a son."

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MINISTER OF AGRICULTURE ON FOOT-AND-MOUTH DISEASE POLICY

Brigadier-General E. Makins, M.P., having received representations from the Knutsford Division with respect to animal slaughter due to infection by foot-and-mouth disease, brought to the notice of the Minister of Agriculture the feeling entertained by certain local residents that this particular policy was open to criticism. He has now received from Mr. Walter Elliot a detailed statement on the Government policy in general on this matter, which is appended:—

The Ministry of Agriculture and Fisheries,
10, Whitehall Place, S.W.1.
December 5th, 1935.

With reference to your letter of December 4th, in which you raise the question of the slaughter policy adopted by the Ministry in dealing with outbreaks of foot-and-mouth disease, as you know, the problem of dealing with this disease without resort to the slaughter of stock has exercised the minds of all concerned for many years, and was one of the main questions considered by the Departmental Committees on Foot-and-Mouth Disease of 1911, 1922 and 1924.

The real danger in foot-and-mouth disease is its extraordinary infectivity, against which there is no known protective agent. The disease is spread not only directly from animal to animal, but indirectly through many intermediate agencies, including human beings, vehicles, feeding utensils, packing materials and even rodents and birds. Every diseased animal is an active manufacturer of virus, which can be carried by these means with great rapidity. It has been found that animals which have been grazing in the same field, or which have been in the same buildings as affected animals are practically certain to fall with the disease, and although showing no observable symptoms at the time of slaughter may be in the initial stage of the disease.

It is recognised that there are a number of effective remedies for the cure of foot-and-mouth disease, but the objection to isolating animals for treatment is that during treatment the manufacture of fresh virus continues and the factors most favourable to the spread of infection would thus be greatly strengthened.

If the disease were allowed to become endemic in this country, as it is in many countries, particularly on the Continent of Europe, the loss of meat and milk would be very serious and stockowners would be faced with a constantly recurring menace. Such a position would also have a disastrous effect upon the export trade in British pedigree stock. The Departmental Committee of 1924 reported that a policy of isolation and treatment would be equivalent, in their view, to the abandonment of any hope of eradicating the disease from this country, and that, until a preventive agent is available, the slaughter policy should be continued. The Ministry has reason to believe that this opinion is endorsed by the large majority of agriculturists throughout the country.

Under existing conditions, therefore, it seems to me that there is no alternative but to continue the policy of slaughter of actually affected stock and of all animals in contact therewith. The Foot-and-Mouth Disease Research Committee is, in the meantime, continuing its investigations in the hope of throwing further light on the problem generally.

Incidentally, I may add that the circumstances of every outbreak of the disease in Great Britain are closely investigated with a view to ascertaining the probable source of infection, but at no time since June, 1931, has any outbreak occurred which could be attributed to the introduction of infection from Ireland. No outbreak has occurred since that date in Ireland.

(Signed) Walter Elliot.

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The Ministry of Agriculture states that the existence of foot-and-mouth disease was confirmed on Monday of last week among cattle at Malmesbury, Wilts. The Order restricting the movement of animals affects a large area in the counties of Wilts and Gloucester. Further outbreaks of foot-and-mouth disease have occurred in the Swansea area.

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SMITHFIELD MARKET: JOINT BOARD TO FIX CONDITIONS

All labour questions at Smithfield Market will in future be settled by a joint conciliation board consisting of representatives of the Unions concerned and the Markets Employers Council. Between 5,000 and 6,000 men will be affected.

A joint statement recently issued announced that the function of the Board would be the fixing of wages, hours and working conditions for porters, shopmen and pitchers employed on the Market. It consists of ten members, five representing the Smithfield Employers Council, and five representing the following Unions: Transport and General Workers, National Union of Distributive and Allied Workers, and Journeymen Butchers Federation of Great Britain.

Lieut.-Colonel T. Dunlop Young, who, until his retirement was Chief Inspector of Meat of Smithfield, will be Chairman of the Board. Two joint secretaries have been appointed, one representing the employees, and the other the employers.

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INTERNATIONAL CONGRESS FOR MICROBIOLOGY

The International Society of Microbiology, of which body Sir John M'Fadyean (Past President) is a "President of Honour" and Professor J. C. G. Ledingham is President, has issued the preliminary programme for the second International Congress for Microbiology, to be held in London from July 25th to August 1st, 1936. The Headquarters of the Congress will be University College, Gower Street, London, and all scientific sections will hold their sittings there. The Executive Committee, of which Dr. F. C. Minett is a member, comprises prominent members of the Society resident in or near London, and the Hon. General Secretary is Dr. R. St. John-Brooks, of the Lister Institute of Preventive Medicine, to whom applications for forms of registration should be addressed.

Included in the programme for Section 1 (General Biology of Micro-organisms) is a discussion (with Section 7 — Microbiological Chemistry) on Anærobic Bacterial Metabolism, to be opened by Dr. P. Fildes (London) and to which Professor W. Frei (Zurich) will be a contributor. In the same section Dr. J. Howard Mueller (Boston, U.S.A.) will open a discussion (also with Section 7) on Nutritional Factors asso-

ciated with the Growth of Micro-organisms. Mr. I. A. Galloway, B.Sc., M.R.C.V.S., is the Secretary of Section 2—Viruses and Virus Diseases in Animals and Plants—and both he and Mr. R. E. Glover, B.Sc., F.R.C.V.S., will participate in the discussion on The General Characteristics of Viruses, including Bacteriophage, while Dr. W. S. Gordon will address the same section on Modes of Transmission and Paths of Infection in Virus Disease. Section 3 (Bacteria and Fungi in Relation to Disease in Man, Animals and Plants) has an extensive programme of papers and numbered amongst the essayists are Dr. A. W. Stableforth and Dr. R. Lovell. Dr. F. C. Minett is a Vice-President of the Section (4) of Economic Bacteriology, Soil, Dairying and Industrial Microbiology, also sharing the duty of Recorder with Mr. E. J. Pullinger, B.V.Sc., M.R.C.V.S. When this Section considers Problems of Biochemical Purification of Sewage and of Trade Effluents, Dr. W. R. Wooldridge will contribute a paper. Professor T. W. M. Cameron of Quebec (late of Edinburgh) will address Section 5 (Medical, Veterinary and Agricultural Zoology and Parasitology) in the discussion on Typhus Fever and the Rickettsias, and in Section 7, Dr. W. R. Wooldridge (the Secretary of the Section) is amongst the speakers on Influence of Substrate on the Chemical Potentialities of the Cell. Specific Immunisation in the control of Human and Animal Disease is the concern of Section 8, of which Dr. W. H. Andrews is a Vice-President, and to this Section Mr. T. Dalling, M.R.C.V.S., Mr. T. J. Bosworth, B.Sc., M.R.C.V.S., D.V.S.M., Professor J. Russell Greig and Dr. A. D. McEwen will speak on the Prophylaxis and Serum Treatment of Human and Animal Diseases caused by Anærobic Bacteria.

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THE PROBLEM OF CANCER

We reproduce below, from *The Lancet* of December 7th, a survey of the changes in outlook on cancer since 1902, the year which saw the establishment of the Imperial Cancer Research Fund. This survey is based on the contribution to the Fund's 33rd annual report of Dr. W. E. Gye, who succeeded Dr. J. A. Murray, F.R.S., as director in October last.

. . . . .

"In 1902, extreme confusion and pessimism on the subject prevailed in the medical profession. There was a firm belief, amounting to a dogma, that cancer was a disease limited to man and that it occurred only in civilised communities, where it was increasing at a terrifying rate. Cancer families, cancer houses, and cancer villages were believed to exist. The causative influence of geological formation, of soil, of climate, of diet, of dwelling near trees or near rivers, was discussed. Many clinicians believed cancer to be an infectious and even a contagious disease. 'Cancer germs' were isolated, or demonstrated in malignant cells by special staining methods. The destruction of bedclothes and other materials which had come in contact with cancer patients was often demanded.

"The morbid anatomists, however, who had done fundamental work in classifying the numerous and different types of malignant new growths and who found it difficult to reconcile the morphological appearances of a cancerous growth with those of known processes of infection, regarded cancer as a cellular disease and propounded a number of hypotheses to explain its origin, of which only one—the Cohnheim theory of embryonic rests—has survived as a possible explanation for certain rare malignant conditions. The question whether the growth of a malignant tumour is brought about by transforming the surrounding normal tissues into cancerous tissues or whether solely by multiplication of cells already malignant was a matter for discussion and controversy. Even the fact that cancer can be cured by operation at an early stage was by no means generally accepted.

"An argument advanced to support the dictum that cancer is a disease of civilisation was the alleged freedom from the disease of lower animals. It is true that veterinary surgeons had described its occurrence in dogs and horses, but the evidence was either ignored or was met by the assertion that the features of the disease did not correspond with those in man, or, alternatively, that contact with man was responsible. It is difficult now to recreate in imagination the atmosphere of uncertainty which led to such an attitude. But it must be remembered that 30 years ago bacteriology had progressed far in its triumphant career, and that many diseases had been found to be transmissible to animals by inoculating into them morbid material from human patients. Attempts had frequently been made to transmit cancer from man to various species of animals, but always without success; and it was therefore concluded by analogy that animals are resistant to cancer. Hanau's observation that a rat tumour can be transmitted to other rats by inoculating pieces of the living tissue was ignored, and Morau's confirmation of it was no more favourably received. Even Jensen's subsequent demonstration that inoculated cancer arises from the actual cells which have been introduced and not through infection of the cells of the new host might have been unrecognised if it had not opportunely coincided with the establishment of the Imperial Cancer Research Fund, which under Dr. E. F. Bashford's direction was undertaking a systematic study of the incidence of cancer in human beings and animals. This study soon showed that the disease could be found throughout the vertebrate kingdom, wherever it was looked for properly. The fact that in all vertebrates animal cells can undergo the malignant transformation and that the resultant malignant cells possess everywhere the same fundamental properties is the foundation on which the experimental investigation of cancer, as it exists to-day, is built. Of the diseases which can be produced experimentally few, if any, simulate the normal human disease so closely as cancer.

"This investigation emphasised the essential unity of the phenomenon of malignancy. It indicated that the process which takes place when a normal cell becomes malignant is essentially the same in whatever species or whatever organ it occurs. From another point of view, however, it was possible, and indeed necessary, to regard cancer as a multiplicity of diseases. Cancer is a disease which may appear in almost any organ or tissue. While in animals there were found to be certain sites of predilection in which cancer occurred with exceptional frequency and which were different in the various species, even in closely related species, of animals, in man cancer is found more evenly distributed over the various organs or tissues. In man this organ incidence shows considerable variation in the two sexes and also in different peoples and races. Here, therefore, the further question arises: 'Why does cancer arise in this or that particular organ?'

"The investigation of ætiological problems of cancer in man is based mainly on statistical data. The opinion, formerly prevailing, that its incidence was rapidly increasing was based on the crude figures representing the total mortality

of cancer. Following an argument previously developed by King and Newsholme, Bashford analysed the cancer mortality statistics with reference to the different organs, considering separately the accessible sites in which diagnosis was easy and the inaccessible sites in which diagnosis was difficult. He also induced the Registrar-General to publish the figures in a table classified according to Sex, Age and Parts Affected, and it proved possible to show that the recorded increase in cancer mortality fell largely though not entirely on inaccessible sites where it is diagnosed with increasing ease. These statistical inquiries demonstrated that cancer is *not* increasing at an alarming rate in civilised communities, or appearing (as was asserted) at earlier ages. Similarly it was shown in other investigations that the disease is found among savages as well as among civilised peoples, and in animals both wild and domesticated, carnivorous and herbivorous.

The Nature of Malignant Change

"Side by side with the general and comparative study of the disease a close examination of the phenomenon of transplantation was made by Bashford and Murray. It was found, as Jensen had already shown, that when a fragment of cancer tissue is grafted the tumour which forms is derived from the living malignant cells inoculated; there is clear evidence, at least with carcinomas, that the normal tissues of the host are not 'infected'—*i.e.*, made malignant by the inoculum. Also, it was confirmed that transplantation is successful only within the species from which the tumour is derived. A mouse tumour will not grow in a rabbit, for example, or *vice versa*. The failure to transmit human cancers to the lower animals now became comprehensible. It was shown, further, that the propagation of a mouse cancer in mice can be carried on indefinitely; the malignant cells live and multiply in an unlimited number of generations of normal mice.

"Clear deductions may be drawn from this experience, which are important in several respects, theoretical and practical. It follows in the first place that the *primum movens* of the disease is in the cancer cell itself; among other points it is clear that successive generations of normal mice are unable to affect the malignant qualities of the transplanted cells. The practical importance of these observations lies in the fact that most 'cancer cures' are based on an assumption that tumours arise and grow because of some constitutional defect in the body of the patient. It has been assumed, for example, that cancers progress because some glandular structure—such as the pituitary or the parathyroid—is discharging inadequately a function which it is supposed to possess, of controlling 'growth.' There is almost always a confusion in the terms employed in the statement of the theory, but the practice is uniform—the preparation of extracts of the normal gland taken from a large animal and the injection of the extracts into patients in the hope of bring about a cure. Such treatment is unsound in theory and valueless in practice.

"The demonstration by experiment of the local origin of tumours, and the proof that the disease is confined to the affected cells and is not spread by contact and infection within the body, confirmed the conclusions reached by the morbid anatomists during the later decades of the nineteenth century and justified the operative practices of the best surgeons, who aimed at the complete removal of a tumour as early as possible. These results of experimental cancer research consolidated what had hitherto been a tentative, unstable theory; it gave a true theory of the nature of cancer which had a direct effect on surgical procedures.

"But if practical medicine derived much benefit from the early results of experimental study, their effect on the theoretical conception of intracellular change was not perhaps so happy. The absence of all microscopical evidence of infection in cancers; the proof that tumours grow out of their own resources, the malignant cell using the body foodstuffs to grow and divide and form the tumour; the fact that tumours of mice could not be propagated by any means except the grafting of living cells; the species specificity of tumours—all these facts, and many others less definite, led investigators to an unshakable conclusion that the explanation of malignancy lies in some alteration in the cell itself, in virtue of which the malignant proliferation is an automatic process, independent of the presence of a continuously acting provocative agent. It is in this sense that tumours are sometimes said to be 'causeless.' In Ewing's words 'the secret of malignancy seems still to remain enshrouded in the obscurities of intracellular life, where it will probably long remain.' Nevertheless when *all* the facts which have been accumulated are taken into consideration we have no need to believe that the theoretical problems of cancer are insoluble.

"It is an encouragement that since the Great War interest in cancer research has widened. It is no longer confined to the microscopic study of the cancerised cell and of its relationships to normal cells in the body. The attack has been extended to the very onset of the disease. In 1902 Bashford drew up a 'draft scheme for inquiry into the nature, cause, prevention, and treatment of cancer' (published in 1908 as an appendix to the Fund's third scientific report) in which the possibility of producing cancer experimentally is discussed in connection with 'sweeps' cancer' and 'petroleum cancer.' He suggested that 'a systematic study of the effects of persistent irritation of different epithelial surfaces in different species of animals might be found to have important bearings.' To the Japanese investigators Yamagiwa and Itchikawa belongs the honour of demonstrating, in 1915, that cancer can be produced in this way by painting an animal with tar. This has proved the starting point of innumerable investigations which have culminated in the preparation by Professor Kennaway and his collaborators of pure chemical substances with carcinogenic properties. Some of these substances are related chemically to the sterols which are normal constituents of the body. The importance of these investigations is too evident to need any comment.

The Problem To-day

"It is now quite clear that two aspects of the cancer problem must be sharply defined: first that which deals with the conversion of a normal cell into a malignant cell (by tar, pure chemical compounds, parasitic worms, radiant heat, X-rays, etc.); and, secondly, that which deals with the properties of the malignant cell itself, seeking an explanation of its power to proliferate indefinitely.

"In 1911, Peyton Rous of the Rockefeller Institute, New York, described a spindle-celled sarcoma of the domestic fowl which could be propagated not only with grafts of living cells but also by means of cell-free filtrates, and since then a score or more of filtrable avian tumours of diverse structure have been described. Each

has the same remarkable property of filtrability, and the agents possess the same extreme specificity shown by the filtrates of the tumour first described by Rous. There now exists, therefore, a group of tumours caused by intracellular agents which have properties indistinguishable from the viruses.

"The first reaction of pathologists to these filtrable tumours was a denial of their neoplastic nature, or, alternatively, an assertion that if they are neoplastic then these tumours are a disease of birds *sui generis* imitating cancers of mammals, but not of the same essential nature. But Rous and his collaborators demonstrated conclusively that if these tumours are not true new growths then the task of describing the characters of new growths must be begun again; for these growths of fowls exhibit all the properties which are accepted by competent students as characteristic of true tumours. Briefly, it may be said that apart from the property of non-cellular transmission there is no clinical, morphological, or biological difference between avian and mammalian tumours. Even this criterion of filtrability cannot be claimed as absolute. There are malignant fowl tumours, such as the spindle-celled sarcoma first described by Rous, which though as a rule easily filtrable, may pass into a state in which they do not yield active filtrates. The tumours occasionally lose growth energy and become comparatively benign; when in this state it is frequently impossible to transmit the growths by any means except by grafts of living tissue. Moreover, the recent discovery of a filtrable papilloma of the cotton-tail rabbit by Dr. R. E. Shope has broken the apparently absolute difference in respect of filtrability between tumours of mammals and tumours of birds. One of the pressing tasks of cancer research is the study of tumours of a greater variety of species of animals.

"The two aspects of the problem, to which reference has been made, have lately been drawn together by experiments carried out by Professor McIntosh at the Middlesex Hospital. Tumours were started in fowls by injecting tar subcutaneously, and the tumours thus obtained were transplanted into normal fowls. It was found for three of such tumours that it was possible, once the difficulties of propagation had been overcome, to transmit the growths by means of cell-free filtrates. If these experiments can be confirmed, the part played by tar in cancer causation is different in kind from the part played by the agent which passes through a filter candle and which can be obtained again and again from each successive generation of tumour.

"Dr. Gye concludes: 'This account of the systematic investigation of cancer which began in an atmosphere of ignorance and pessimism 30 odd years ago, and which has since developed into an independent discipline of medical research that is being carried on vigorously in every civilised country, is necessarily brief and incomplete. . . . But it can be said without fear of contradiction that the knowledge of the disease gained in this short time is more extensive than that of most other chronic diseases and has profoundly influenced its diagnosis and treatment. Cancer has ceased to be an unaccountable mystery, and we need no longer fear that its solution surpasses the wit of man.'"

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SCIENCE IN MODERN LIFE

"Science in Modern Life" was the subject of the valedictory address delivered to the Royal Society by the President, Sir Frederick Gowland Hopkins, O.M., F.R.S., on November 30th, and reproduced in *Nature*, December 7th.

Sir Frederick Gowland Hopkins prefaced his remarks on the social responsibilities of science by referring to the contention of some, on the one hand, that the supposed social harms created by science are due to its own unethical character, and on the other the contention of General Smuts that, while to-day religion, art and science are separate values, they may not always remain so—indeed, that one of the greatest tasks before the human race will be to link up science and ethical values. Apart from future developments, however, the gap between what science provided for humanity and what were usually spoken of as values in religion, literature and art was less wide than was assumed in some quarters. History itself showed that it was wrong to deny ethical influence, even if it were indirect, to the scientific spirit. The influence of Darwin and Lyell did more than establish a new outlook for science itself. It re-orientated all thought, causing heart-searchings where there had been complacency in the acceptance of tradition, and its impacts subtly encouraged the growth of that intellectual honesty for which Huxley and others then so nobly fought.

It was the influence of science, too, which more than any other influence, established the idea of progress, replacing as it did a static by an evolving universe, and incidentally a faith that man himself has an inherent capacity for advance. By this faith, hope was fed, human efforts towards betterment were encouraged, and ethical values emerged.

The tendency of late, however, had been not so much to reiterate the theme of science's gifts to the powers of destruction, but rather to urge in a more general sense that scientific workers had not shown sufficient interest in the social implications of their work, or in the public responsibilities of their calling. The essayist maintained that this view was unfounded, for the scientist's opportunities were not those of a politician, or missionary, though of course it remained his duty to give his skilled services to the public whenever they were legitimately required or invited. The gap between the mind and outlook of the publicist and those of the trained scientist was lessening—modern statesmen did occasionally seek scientific guidance—but it was perhaps time that "the building of a bridge should begin on the scientific side of the gap." That was a task for organised scientific effort and the pooling of knowledge.

There was, however, one branch of scientific enquiry which could claim to yield knowledge of unqualified benefit to humanity and that was the study of the nutritional needs of the body. The last two decades had seen a remarkable activity in research in this direction in almost every country where science was pursued and an international approach to the subject had been made by the League of Nations.

In reference to malnutrition, the lecturer said that while underfeeding and ill-feeding certainly existed, to measure their extent was a task of some difficulty. There was no clear definition of the term "malnutrition" and Sir George Newman, formerly Chief Medical Officer of the Ministry of Health, held that the principal cause of undernourishment was a body unable to assimilate the food supplied to it. While that might be true in certain cases, one was entitled to ask whether in many cases the disability of the body when observed has not followed upon malnutrition at an earlier period. From the report of the Chief Medical Officer of the Ministry of Health for 1934 it was seen that in certain depressed areas in Durham the statistics of actual diseases did not indicate unfavourable

effects of present economic conditions, but full normal nutrition was only claimed for 70 to 80 per cent. of the children, while the condition of adolescent youths was far from satisfactory. Further, taking the country as a whole, the results of medical examinations of prospective recruits to the Army showed that 38 per cent. were rejected for defects which might well be due to faulty nutrition in childhood.

Sir Frederick also dealt with present-day knowledge of food-values, stating that "the intelligent public will learn to apply the newer knowledge without discomfort to itself" and brought his address to a conclusion in the following terms:—

"One last consideration. Is the time yet ripe for the initiation of a comprehensive national food policy: one that will endeavour to adjust production, in a qualitative as well as a quantitative sense, to right consumption, and at the same time organise all the details of distribution on national lines?

"I note that those responsible for the contents of that very impressive book entitled 'The Next Five Years,' which has appeared under the ægis of many influential names, hold that no administrative action less comprehensive than a national policy of the kind in question could deal adequately with existing problems. They suggest that it should now be taken in hand. Others have urged that, apart from the almost prohibitive magnitude of effort the policy would require, it is one which should await the arrival of more knowledge. The latter suggestion has, I think, but little point. There is doubtless much more scientific knowledge to be gained about nutrition and food production, but we know enough to guide administration on to the right lines.

"More to be thought of perhaps is the fact that if we take a long range view, any policy concerned with food production must ultimately, if it is to be ideal, become part of a world policy. At Geneva, Mr. Bennett, speaking of such a world policy, said that its aim would be to 'marry agriculture to health.' Such a marriage, if ever properly consummated, would greatly profit the world. The interests of both partners must be equally guarded, however, in the marriage contract. In Great Britain, one may venture to say, the first mentioned is at present receiving preferential treatment."

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PROGRESS OF FOOD INVESTIGATION

We publish below an extract from the summary of the report of the Food Investigation Board for 1934* appearing in a recent issue of *Nature*.

"As in previous years, the report describes the researches carried out at the various research stations of the Board by the members of the food investigation staff and emphasises the ways in which laboratory results have been applied commercially. Sir Frank Smith was appointed chairman of the Board, in succession to Sir Joseph Broodbank, who resigned; Mr. E. Barnard was appointed director of food investigation and Dr. Franklin Kidd superintendent of the Low Temperature Research Station, in succession to the late Sir William Hardy. That the work of the Board is of value to all parts of the Empire has been signally recognised by the contributions made by Dominion Governments, which amount to nearly £10,000 a year, and show the wide extent to which Imperial co-operation in this field of research has already grown.

"The discovery that beef can be stored in the chilled state for 60 to 70 days when the atmosphere contains 10 per cent. of carbon dioxide has quickly led to the importation of considerable amounts of chilled beef from Australia and New Zealand; during 1934, no less than 4,400 tons were imported in gas storage from these two Dominions, and it is now practicable to secure the necessary gas-tightness in the holds. At the same time, the careful preparation of the meat and the hygiene of the slaughterhouse floor are probably of even more importance than control over the conditions of transport.

"A number of problems, however, remain for solution, including the correct storage to prevent chafing, and the proper conditions as regards cooling, humidity and air circulation for the preservation to the fullest extent of the natural appearance or bloom of the meat. Loss of bloom is largely due to the oxidation of hæmoglobin to methæmoglobin; the reaction is monomolecular with respect to the concentration of reduced hæmoglobin and roughly monomolecular with respect to the partial pressure of oxygen; the rate is maximal at a partial pressure of about 23 mm. of carbon dioxide. The results show that 10 per cent. of carbon dioxide in the atmosphere has a negligible effect, but with this concentration that of oxygen must be increased to more than 60 per cent. if the production of methæmoglobin is to be appreciably retarded."

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DIETETIC DEFICIENCIES

The Health Organisation of the League of Nations has recently issued a report on the physiological bases of nutrition prepared by the Technical Commission appointed by the Health Committee, this appointment having been made after a general report on nutrition had been presented by Dr. E. Burnet and Dr. W. R. Aykroyd. The Commission declares that it is in agreement with the conclusions of these workers that deficiencies in important nutrients are a common feature of modern diets and that these deficiencies usually occur in the protective foods (foods rich in minerals and vitamins) rather than in the energy-giving foods (proteins, fats and carbohydrates).

Milk, whole or skimmed, is a rich source of calcium salts and phosphates and of vitamin B_2, also a good source of vitamin B_1; milk fat is an excellent source of vitamin A. Eggs contain vitamins A, B_1, B_2, and D, and are rich in iron. The proteins of these foods are not only themselves of the highest nutritive value, but also improve the utilisation of the protein contained in cereals and vegetables. Milk has an additional advantage in the abundance and availability of its calcium salts and phosphates; these enhance the effect of any vitamin D derived from other articles of diet or from sunshine. Milk, although itself poor in iron, renders more effective the iron contained in the diet.

Ordinary diets are usually inadequate in vitamin D and, except in sunny seasons and sunny countries, a small daily ration of cod-liver oil is to be recommended in the diet of the pregnant and nursing mother, and in that of the growing child. Fish-liver oils are the richest known natural sources of vitamin A and are also important sources of iodine. In goitrous regions, where sea-fish are not available, the provision of extra iodine in the form of iodised salt or in some other way is recommended.

An extended dietary use of the potato is recommended to replace part of the sugar and

* Department of Scientific and Industrial Research. Report of the Food Investigation Board for the year 1934. pp. 261 + x. (London: H.M. Stationery Office, 1935.) 4s. net.

highly milled cereals in the ordinary diet. Potatoes provide extra vitamin C and more readily available calcium and phosphorus than are present in cereals. Potatoes also yield more iron and B vitamins than milled cereals. This applies to countries where potatoes are abundant, but it remains true in general, due account being taken of local resources.

In a general summing up it is laid down that, although a simplified diet may be so constituted from a few protective foods as to be satisfactory, it is a general principle that variety in diet tends to safety, provided it contains a sufficiency of the protective types of food materials. White flour in the process of milling is deprived of important nutritive elements. Its use should be decreased, and partial substituion by lightly milled cereals and especially by potatoes is recommended. The consumption of an excessive amount of sugar is to be condemned, and in this case also partial replacement by potatoes or their equivalents is urged. Milk should form a conspicuous element of the diet of all ages.

The Commission draws attention to the high nutritive value of skimmed and separated milk, which, although deprived of its vitamin A through removal of the fat, retains the protein, the B and C vitamins, the calcium and other mineral elements. The Commission deplores the large wastage in many countries of this valuable food.

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PEOPLE'S LEAGUE OF HEALTH

Presiding at the Annual General Meeting of the People's League of Health, held at 12, Stratford Place, London, W.1, on December 16th, 1935, Dr. C. O. Hawthorne, the Chairman of Council, said that one of the chief activities of the League during the past year had been its campaign for a safe milk supply, the word "safe" meaning, not merely cleanliness and lack of adulteration, but freedom from the risk of tuberculosis and other communicable diseases. He instanced a number of facts which gave point to this contention, among them the fact that during the past twelve months there had been at least two epidemics of scarlet fever and one of typhoid, traceable to the milk supply. The League had strongly insisted that no milk except that obtained from cows certified free from tuberculosis should be taken as a food unless it was pasteurised. By pasteurisation the League understood the process which was officially defined by the Board of Trade entailing the use of special apparatus and skilled supervision. It was this which the League had pressed continually on public authorities.

Miss Olga Nethersole, the Founder and Hon. Organiser of the League, said that one very pleasing feature of the work was the increasing number of requests for the League's publications and advice and assistance with Health Weeks, which were coming from the Dominions and Colonies. She had been informed that a New Zealand League of Health had been inaugurated. With a growing demand for knowledge regarding the conservation of health, there should not be any cessation in research, health education, development of equipment and organisation of technical means for dealing with health problems. Miss Nethersole said that she hoped to see health education properly correlating with other subjects in all our schools and universities.

Sir Frederick Hobday, Chairman of the Veterinary Council of the League, spoke of his Council's scheme for the eradication of tuberculosis from the herds of the country. The subjects which were being considered were the principal diseases of dairy herds and consequent wastage, and the building up and maintenance of tubercle-free herds. The dangers which lurked behind the human "carrier" of specific diseases which might be transmitted through the agency of milk to the unsuspecting consumer had not been disregarded. It was hoped that the report on the scheme would be ready for publication during the late spring.

Sir Pendrill-Varrier Jones, in dealing with the importance of the work which had been carried out by the League during the past 16 years, made special reference to its first International Health Conference held at the British Empire Exhibition in 1924, and made the announcement that another such conference would be held by the League in 1937.

Other Official Members who addressed the Meeting on various sides of the League's activities included Sir Robert Armstrong-Jones, Dame Maria Ogilvie Gordon and Professor Winifred Cullis.

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THE SCOTTISH FARMER ALBUM, 1936

"The Scottish Farmer Album and Farming World Year Book" is now on sale at the bookstalls. The livestock photographs number close on 120, while this year a special feature has been made of the breed reviews, the services of several outstanding breeders and owners having been enlisted to record the activities of the breeds during the year. Mr. Alexander Sutherland, M.A., editor of *The Scottish Farmer*, reviews the Shorthorn cattle and also contributes reviews of Clydesdales and other heavy breeds of horses; light-legged horses and ponies; and Half-bred and Down sheep. Mr. A. N. M. Buchanan, sub-editor of *The Scottish Farmer*, reviews the doings of the Ayrshire cattle and Cheviot sheep. Mr. R. L. Grant, who deals with the Aberdeen-Angus, draws attention to the decided improvement in the export trade for Aberdeen-Angus cattle. He mentions that the best customer was again Australia, and that the reports received from that country indicate a very bright future for Aberdeen-Angus cattle there. Galloway cattle are reviewed by "A Chiel"; British Friesians by "Bertus," who mentions that at the various shows during the year it was evident that more attention could be paid to the shape of the udder, as cows with large unshapely udders may give large quantities of milk for a year or two, but will not generally wear so long as the cow with the compact udder; Highland cattle by "Iain Donn"; Hackney and Harness Horses by "Invicta"; and Blackface sheep by "L. Y. P." Each review is accompanied by statistical matter which shows at a glance the result of the year's trading, together with various years' figures for comparison. Prize lists at various shows are also included in some of the reviews, together with the list of the most successful breeding Clydesdale stallions. This year Craigie Beau Ideal (21856) displaces Benefactor (20867), who took the place of Dunure Footprint (15203) in 1928.

The price of "The Album" is 1s. 6d., or post free 1s. 10d., and copies can be had from any bookseller or direct from the office of *The Scottish Farmer*, 93, Hope Street, Glasgow, C.2.

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CONTROL OF SWINE FEVER AND BOVINE TUBERCULOSIS

At a meeting of the Somerset County Agriculture Committee, the Diseases of Animals Sub-Committee reported that, in view of the prevalence of swine fever, they were requesting the Ministry of Agriculture and Fisheries to consider the question of resuming the practice of slaughter

and payment of compensation in the case of this disease.

Mr. C. Horder said there had been a great deal of swine fever in the county during the past two quarters. There were 1,675 pigs involved during the past quarter, and in four outbreaks over 1,200 pigs were on the premises. The general feeling was that the matter should be taken up by the Ministry and that instead of pigs, at the first sign, being sent to market to spread the disease, if farmers were compensated the cases would be reported. They were all concerned, for it was occurring right through the country, and if they could get the Ministry to adopt the suggestion it might be the means of stopping the spread of the disease.

The report was adopted.

The County Treasurer reported that since the last meeting the sum of £106 17s. had been paid as compensation for animals slaughtered under the Tuberculosis Order, 1925.

Captain the Hon. T. H. Watson said that time after time they had called the attention of the Ministry to the deficiencies of the Tuberculosis Order, and it was not too much to say that it was an almost useless measure. They had sent representations to the Ministry, they had discussed the matter with the County Medical Officer, and he could only sum it up by saying that under the Order one kept a cow until she had done all the possible damage she could in life, and then one killed her. That committee was doing its best loyally to work an absolutely inefficient Order.

Mr. J. M. Boltz said he felt the committee really ought to press the Ministry to assist the Diseases of Animals Committees throughout the country by amending the Order in such a manner as to make it effective. It was useless to spend the amount of money they were spending at the present time when animals should be declared much earlier.

It was decided to recommend the County Council to draw the attention of the County Councils' Association to the matter.

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THE MUSK RAT: MINISTRY'S SUCCESSFUL CAMPAIGN

"The musk-rat, which during the latter half of 1932 threatened to develop into one of the most serious enemies of the countryside, now seems to be completely under control," says a correspondent to *The Times*. "After the lapse of three years it is not easy to recall the scare caused by the realisation that this pest had spread over a large area of land in the West Midlands and Sussex, and was threatening watercourses, embankments, dams and so on.

"In Shropshire, in particular, the expenditure of moneys on repressive measures was criticised by many people who ought to have known better; but the best answer to this sort of unimaginative criticism is the publication of the figures showing the numbers of musk-rats trapped during the campaign. They are as follows:—

Half-year ended.	No. Musk-rats caught.
June, 1932	208
December, 1932	1,323
June, 1933	722
December, 1933	332
June, 1934	119
December, 1934	65
June, 1935	5
November, 1935	0

"These figures relate to Shropshire, which was the centre from which the rodents escaped.

"The fact that no musk-rats have been caught during the last half-year does not, of course, rule out the possibility that one or two couples may be lying hidden in remote places. There is still need of vigilance if complete extermination is to be achieved. Mr. Brendan Vallings, whose skill and intimate knowledge of the habits of the pest have contributed so largely to the success of the Ministry's campaign, still has a great deal to do, investigating suspicious cases from almost every county. In practically every instance, however, the suspicious character has proved to be the ordinary water vole."

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TREATMENT OF HÆMORRHAGIC DISORDERS WITH VITAMIN C

Reporting his experiences with the above in a recent issue of *The Lancet*, Dr. H. Engelkes summaries his conclusions in the following terms: "In the above three cases the favourable results obtained in Stepp's clinic were repeated. In only one of them, where the patient had salicylates after the hæmorrhages had disappeared, was any remedy given apart from ascorbic acid. In all three cases the administration of ascorbic acid was followed by rapid improvement, and it caused no unpleasant symptoms. I have since seen two other cases in which the same treatment proved successful. The patients of this series had capillary hæmorrhages. Where the hæmorrhage is venous or arterial—*e.g.*, in duodenal ulcer—I should not attempt to treat it with ascorbic acid."

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BOMBAY GRASSES

The following "research item" appears in *Nature*, December 7th: "Since the publication of the 'Flora of Bombay' (1903), many additions have been made to the grass flora of the Presidency, and there have been many changes in generic concepts. In a recent volume (Imp. Council Agric. Research; Scientific Monograph No. 5, 1935) Blatter and McCann have brought up to date the systematic account of the Gramineæ of this area. More than three hundred species belonging to 110 genera are described, and many are illustrated. In the definition and sequence of the tribes, the authors have followed Stapf. Full descriptions of the species are supplemented by vernacular names, notes on etymology, ecology, economic uses and distribution. Keys are given for the genera and species."

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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AU JOUR LE JOUR

To the Editor of The Veterinary Record

Sir,—A study of the advertisement columns of *The Veterinary Record* furnishes a valuable historical guide to the changes which are taking place from day to day in the profession as a result of the increasing powers which are delegated to Local Authorities, or which Local Authorities are taking upon themselves as a result of the recommendations of the Grigg Commission and the Gowland Hopkins Committee.

These changes, it will be noticed, are not in regard to "town" or "city" practices, but to "agricultural" practice, or, as the advertisements are worded—"general practice." In one

recent issue there are three agricultural practices "for sale" owing to owners having received Government (?) or whole-time appointments. I wonder if these practices will be "sold," or will someone seize the opportunity to "start practice" or will they remain "vacant"? One owner will sell a £650 practice for £350; another asks for "offers" for his practice which "returns" £700 p.a. and the other simply says that his practice returns £500 p.a.—the last seems rather pessimistic but "takes a chance." In this respect, one notices that the few practitioners requiring a practice will not consider anything below a return of £1,000 p.a.—wisely, I think, because the "writing on the wall" (this phrase is becoming hackneyed) points clearly to the fact that the £400 to £700 p.a. given by Local Authorities for whole-time work with no "bad debts" and no "overhead charges" is preferable to a practice "returning" £600 or £700 a year.

This foreshadows what many of us have warned the profession will be the result to agricultural practice of whole-time service, *viz.*, that agricultural practice *qua* agricultural, will cease to exist. As these appointments are usually limited to men under 40 years of age, men over that age are precluded from applying for them. These older men must perforce remain in agricultural work, doing *more* work than they are capable of doing owing to *larger* areas having to be covered on account of smaller practices becoming untenable, increasing years and, in some instances (or probably *all*), in not being able to employ assistants even if they were to be had. Such a practice would be too much for one and not enough for two, as assistants in these days of "increased cost of living" require remuneration three or four times in excess of what one received some 40 years ago even though their "practical" knowledge is practically nil. I well remember feeling exceptionally "well off" at £2 a week and "live in"—and doing *all* the work of the practice. "*Mutatis mutandis.*" What will happen to agricultural practice when these men "over 40" retire or die off?

These "whole-time" appointments are, I feel sure, only a temporary phase in the history of the profession. Even now Local Authorities are finding it difficult to secure "Assistant Veterinary Officers," are raising the "commencing salary," and even then are rejecting most of the few applicants because "they have not the necessary qualifications or experience." If they want men they must take what they can get, or revert to the "old" time practice of giving the general practitioner the work—and giving adequate remuneration for what are apparently regarded as highly specialised duties.

This "temporary phase" is, however, a very short-sighted policy. Taking a not very long view, it is bad for the profession because it leads to specialisation—the specialist confining himself to the clinical examination of *cows*. Diseases of animals (other than statutory ones), their diagnosis and treatment will be a thing of the past.

That being the case, a restored and flourishing agriculture—and agriculture, I feel confident, will recover—will be crying out for a qualified veterinary surgeon to help with the stock. It will be useless to apply to the whole-time inspector; his time will be fully occupied with his special duties, even if he were *au courant* with the treatment, or even the diagnosis of disease outside his special or rather limited duties. I fancy he would "think a long time" before he undertook a bad dystokia or a retained placenta four or five days old.

But are the whole-time man's duties limited? There seems to be, even now, a "creeping extension" of his duties. The East Sussex "Director of Agriculture," who or whatever *he* may be, wants a C.V.O. to carry out the duties of inspection, etc., under the Diseases of Animals Act and the Milk Orders—"*experience of lecturing to farmers and others will be considered an additional qualification.*" I feel inclined to ask, "Why was this advertisement accepted?" The East Sussex Local Authority obviously considers this to be a very "minor" appointment, as it has delegated *its* powers to the "Director of Agriculture," not considering the fact that this post requires a professional training of at least five years, and *should* require additional time to acquire some practical experience of cattle practice. I am wondering what the "professional" training of a "Director of Agriculture" is. Is it a B.Sc. obtained at some small agricultural College? If so, it seems very derogatory that the qualifications of applicants for special posts under the Ministry of Agriculture and the Ministry of Health have to be investigated and weighed by a "Director of Agriculture." Surely our members have some proper professional pride?

So the "history" develops. Where will it lead?

Yours faithfully,
J. W. Hall Masheter.

Ruddle House,
Newnham-on-Severn.

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"CECIL ALDIN" MEMORIAL FUND

To the Editor of The Veterinary Record

Sir,—It is felt by a large number of the friends of the late Cecil Aldin that there should be a lasting memorial to that great artist and animal lover.

Cecil Aldin's pictures and sketches have given delight to so many the world over that we are confident we may count on a generous response and that many people will be glad of this opportunity of showing their appreciation of his inimitable work.

The committee feel that in suggesting the memorial should take the form of a Scholarship or Bursary at the Royal Veterinary College they are carrying out what would have been the great artist's wish and is in accordance with the views of the members of his family.

We are,
Yours faithfully,

Rosebery
Frederick T. G. Hobday
C. Eric Palmer
H. Tudor Crosthwaite
W. E. Lyon
H. R. W. Wood
George P. Male, *Treasurer.*

} *Committee.*

Donations may be sent to George P. Male, Westcroft, Earley, Reading, or to Lloyds Bank, Broad Street, Reading, and will be duly acknowledged in the Press.

The Editor acknowledges, with thanks, the receipt of the following:—

Reports of meetings of the Western Counties and the West of Scotland Divisions, N.V.M.A., from Captain S. J. Motton and Mr. Alex Thomson, respective Hon. Secretaries.

Communications from Mr. H. E. Bywater (London), and Mr. S. G. Wilson (Zomba, Nyasaland).